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Editorial Notes

Solid Smokeless Fuel

"THERE is no doubt that there is a definite, immediate, and potentially increasing demand for a supply of solid smokeless fuel for domestic as well as a host of industrial purposes." This introductory sentence to the Paper read by Dr. M. Barash at the meeting of the Irish Association of Gas Managers—see later pages—was followed shortly afterwards by the suggestion that the present position in regard to the production, preparation, and utilization of coke is almost exactly as it was in 1925 when the winning Papers in the World Coke Competition organized by the "JOURNAL" were published as a Special Number. True, many of the fundamental problems are the same, but the position is in our opinion by no means the same. The Coke Competition was organized to stimulate interest in and promote a thorough study of the questions of gas coke production, handling, preparation for the market, utilization, and sales. That it did stimulate interest it will be generally agreed, and since that time ever-increasing action has been taken by the Gas Industry to put its house in order in respect of the coke market. Much, admittedly, remains to be done, but a very great deal has been accomplished.

It has been borne home that development of the market entails the production of coke suitable for specific purposes and properly graded into sizes appropriate for particular applications. Screening, cutting, and grading plants have been widely, and wisely, installed by undertakings both large and small, and a real endeavour, though not a universal one, has been made to ensure that the consumer shall be supplied with coke of uniform quality. Attention has been paid to the influence of ash and moisture contents, to reactivity, and to many other properties affecting the satisfactory performance of coke for a variety of uses both domestic and industrial, and at the same time very great improvements indeed have been made in coke burning equipment and new appliances have been developed and new uses found. Dr. Barash referred to such applications as grass drying, land traction, soil warming and orchard heating, and fog lifting, but to our mind he insufficiently emphasized the advances made, largely as a result of the sterling work of the London and Counties Coke Association, in coke consuming appliances, and failed to stress adequately the work in co-ordinating the sales of coke carried out so eminently successfully by the Association, without which work the Industry's coke market would be in a much sorrier state.

The Paper will, however, prove most useful to the busy engineer in giving him a broad picture of what has been accomplished technically, and what is being done, to produce more satisfactory types of coke; it is a helpful summary of many of the lines of investigation which have been undertaken or are in progress, though one would have liked to see more expression of the Author's personal views on several of the phases of work on which he touched. In the opening part of the Paper Dr. Barash discussed the types of coke produced by the various carbonizing systems, pointing to the advantages of continuous vertical retort coke for domestic purposes—for the open firegrate its freer burning properties and easier ignitability compared with cokes normally produced in static forms of carbonizing plant. However, for special grates, domestic boilers, and closed stoves the denser cokes made in static plants are found to be equally satisfactory and may in many cases be preferred by the consumer. Regarding quenching, the Author said that wet quenching should be avoided as far as possible. There is no doubt that cooling in inert gas is preferable to cooling with water, especially when the coke is for use in the open firegrate, but more care is being exercised in wet quenching and we know of undertakings which market no domestic coke of a moisture content above 2%. Discussing coke handling, Dr. Barash pointed to the depreciation in appearance of coke and production of excessive breeze as a result of careless handling during loading, transport, and transfer from one piece of plant to another, and as an example of the breakage which can be avoided he mentioned that a recent installation of spiral chutes for filling hoppers, instead of allowing the coke to fall from a height, resulted in a reduction of breeze below ½ in. from 7·5% to 1·9%, and below ¼ in. from 9% to 3·5%—a saving of over 1 cwt. of coke per ton handled. In regard to the use of coke in the open firegrate the recently issued

report on the subject by the Fuel Research Board—commented on in the "JOURNAL" for Dec. 15 last—was summarized in the Paper, but the Author did not refer to the previous work of the South Metropolitan Gas Company. We consider this work, the results of which were published by the Company in 1934, to be of the first importance.

Importance of Uniform Delivery

We have mentioned in the foregoing that an endeavour has been made to ensure that the consumer shall be supplied with coke of uniform quality, but there is a great deal to be done generally in this regard. A consumer may get to know by experience how to use a particular coke, but if a delivery happens to be of a different quality—not necessarily better or worse, but different—the consumer rightly becomes exasperated. In this connexion interest attaches to a suggestion made by the contributor of the article on "The Coke Market" which appeared in the "JOURNAL" for Aug. 10 and Aug. 17 and which gave the views of a coke oven manager on the future of the coke market in the light of the series of articles on the problem which we published in the "JOURNAL" in June last. These articles, now available in reprint form, were the result of an independent investigation into the present and prospective situation, in which the interests of producers, distributors, and consumers were all given due weight. Now the suggestion to which we have referred is that cokes should be classified into a limited number of grades by a standard combustibility test, the nature of which might be established by the British Standards Institution. Our contributor argued that then the consumer would know, for example, that if he bought coke in the first category—he called it open grate coke No. 1—he could expect it to burn in the open grate without special coke burning appliances. A second category "open grate coke No. 2," would be suitable for special coke burning grates for the open fire. A third category might not be very suitable for any form of open grate but would be satisfactory for use in hot water boilers and other closed stoves. Finally, there could be furnace coke. The structure and composition of a coke are not the only things which influence combustibility; the size of the particles has a considerable influence. But, contended our contributor, size need not enter into the test, which should be conducted on the particular grade or grades put forward by the producer as falling within the particular category. One producer's "open grate coke No. 2" might be from 1 in. to 2 in.; another's might be from 1 in. to 1½ in. That would not matter provided the cokes burnt in the standard test according to the prescribed conditions for that grade of coke.

The maintenance of uniform quality in coke is unquestionably of first importance and if a satisfactory standard test, agreed by all coke producers, could be established as suggested by our contributor it would certainly help matters. It is difficult on the face of it to see how such a test could be prescribed, for there are so many variables to consider. Moisture content is one of them, and the percentage of moisture present is not necessarily a criterion of a coke's quality. Coke for the open firegrate should burn without noise and be free from "fliers"—a frequent source of complaint. Investigations have shown that noisy combustion and "fliers" may be determined, in part at any rate, by the method used for cooling the coke after carbonization. Shock quenching the coke with water, it has been stated, produces noisy burning coke; on the other hand, cooling with inert gases or air produces a silent burning fuel. In an experiment described in the "JOURNAL" some time ago a parcel of air-cooled coke was allowed to stand in a bucket covered with water for twelve hours and then allowed to drain to the point where the coke retained its moisture without dripping. On its being used to replenish a fire in the open grate, no noise or "fliers" were observed.

Again, the quality of the ash may be almost as important as the actual quantity expressed by weight; a light and floury ash, besides being more noticeable in the fire on account of its light colour obstructs the passage of air through the fuel bed and is often difficult to remove. Flocculent ash often causes excessive dust trouble on account of the ease with which it spreads about the room when it is disturbed in the grate. It has prejudiced many a housewife against the use of smokeless fuel which in other respects she has found satisfactory. There are other variables—volatile matter, structure, and so on. If, however, all these variables could be reconciled in a standard test the observance of which resulted in a greater measure of uniformity, an important advance would have been made.

Life of Tarmacadam

In a very useful booklet published by the British Road Tar Association dealing with the British Standard Specifications for tarmacadam reference is made to its life and to the length of time it has been in use. There is no record of who first used tarmacadam, but it is known that it has been in use for fifty or sixty years. Its wide utility is proved by figures given in one of the Ministry of Transport Reports on a Traffic Census taken on Class I. roads. These show that counts were made at 4,955 points, and that at 2,686 (54%) of these points the road surface was of tarmacadam. As to its life, there are authenticated cases of a life of more than 40 years under fairly heavy traffic, of course with suitable maintenance, and many more where the material has been down for 25 to 30 years. A good instance in which tarmacadam laid on classified roads shortly after the War is still doing its work after perhaps 15 years came to light recently. In co-operation with the Department of Scientific and Industrial Research, the Association carried out some trials of various tars on a section of the Great North Road, not many miles outside London. It was found that the surface of the road was tarmacadam laid 15 years before. It was carrying 6,800 tons per day on a carriageway width of 27 ft. The road had been maintained by surface-dressing with tar; the last dressing was two years old, and would not have been touched but for these experiments. Moreover, it was an excellent piece of non-skid road. A recent meeting, mainly of road engineers, was told of a length of tarmacadam laid on the Great North Road near Darlington in 1911, which had needed no subsequent treatment, except surface-dressing about once in three years. After 25 years a sample of this had been examined, and it was found that even then the tar was "alive."

An Index of Progress

Wherever may lie the truth of the rival claims that profits are made "in the retort house" on the one hand and "in the showroom" on the other, there is no gainsaying the fact that both sides have been particularly active recently in adding their quota to the progress of the Industry. Hand in hand with the modernization and extension of gas-works plant—much of which introduces architectural features which would never have been dreamed of a few years ago—has sprung up a new conception of gas showroom construction. Just as in the past the retort house was a building which no one thought to make architecturally pleasing, or otherwise to mellow its bald outlines, so the gas showroom, where it existed at all, was merely a shop—and not a particularly attractive one at that. To-day, however, the up-to-date gas showroom presents an entirely different picture. The whole idea of modern showroom construction has undergone a complete

change, and, along with it, the design of the interior. A definite effort is being made to erect buildings which not only attract the eye, but also enhance the amenities of the neighbourhood in which they are erected and consequently the reputation of the gas undertaking responsible. Within the past few weeks we have described in the "JOURNAL" official opening ceremonies of new carbonizing plant at Rochdale, Barnstaple, and Abergavenny; and in the "JOURNAL" for Aug. 10 we pictured an architect's drawing of what the carbonizing plant will look like when completed at Blackpool's new works at Marton, exemplifying the modern conception of gas-works architecture. And as some indication of the remarkable advance which the Industry is making on the service side, we find that during the past year we have recorded in the columns of the "JOURNAL" the opening of more than thirty new gas showrooms in all parts of the country—ranging from the magnificent premises at Liverpool and elsewhere down to small but none the less effective branch showrooms in outlying rural districts. A fortnight ago we published a description of the new showrooms at Folkestone; on later pages to-day will be found an account of the new premises of the Portsmouth and Gosport Gas Company, inaugurated on Friday last. We hesitate to guess at the amount of capital which all this progress represents, but could any more emphatic answer be given to the question "Is the modern showroom worth while?"

Striking the Modern Note

All these premises are creating a renewed interest in gas, and in the very modernity of the buildings themselves are, by a natural association of ideas, bearing eloquent testimony to the fact that gas is a thoroughly up-to-date fuel, backed by a service which the very efficiency of the showroom represents. To-day the showroom is decorated on bright and colourful lines. Instead of the heterogeneous collection of dull appliances scattered haphazardly about the interior, we have a series of properly sectionalized displays, often completed by the inclusion of typical modern rooms containing the latest gas equipment. Gone are the black gas fires standing starkly against the walls; they are replaced by coloured models in pleasing surrounds—showing that gas heating service is not confined to the heating unit alone, but extends to the fireplace treated as a composite whole. Water heaters are neatly grouped together in floodlighted alcoves, and so on. Another interesting and valuable feature of modern showroom practice is the inclusion in almost every case of a fully-equipped demonstration theatre—thus bearing out the Industry's policy of providing facilities which go beyond the mere supply of gas and gas appliances. The Industry is giving a very real measure of Home Service. In these lecture halls we have in the platform itself a modern kitchen with every labour-saving device. These attractive and efficient new gas making installations, and these well planned and well organized new showrooms, provide a pointer to the Gas Industry's progress in an age of intense competition.

Prepayment Popularity

For many years past, the popularity of the prepayment meter has been one of the striking features of the distribution side of the Gas Industry, and that the appliance, and the principle which it represents, should have found favour with a very large section of consumers is by no means to be wondered at. That the test of time should have failed to dislodge the prepayment meter from the positions which it has won in the homes of the people can hardly give rise to surprise. But admitting all this, one may confess to being impressed by the further strides in popularity which it makes unceasingly. The paragraphs under "Gas Undertakings' Results" that we have been publishing during recent weeks have provided eloquent testimony to the robustness of the prepayment system of gas supply, and on another page of this issue of the "JOURNAL" will be found additional evidence of a like character. At Motherwell and Wishaw there are nearly four times as many prepayment as ordinary consumers, and they take well over one-half of the total amount of gas disposed of. In the case of St. Helens the figures are even more striking, for there 27,213 consumers are supplied through prepayment meters, and only 2,963 by ordinary meter. The latest report from Oswaldtwistle shows that, while the consumption by ordinary meter shows a decrease of practically 3 million cu.ft., prepayment meter consumption registers a small increase on the year. Of the output of gas during the past financial year at Loughborough, 23½% was taken by ordinary domestic meter consumers, and practically 40% by prepayment meter users. Very much the same story comes from Colne, where of the gas consumed in the past year 28½% was taken through ordinary meters and 43½% through prepayment meters. No doubt, various considerations emerge from the ever-green popularity of the prepayment meter, but the class of consumers who take gas by this means is a faithful one, and one that fills a very important place in the structure of the Industry.

Letter to the Editor

Low-Temperature Carbonization

SIR,—May I demur in regard to two statements in the excellent and far-seeing leading article on low-temperature carbonization in your issue of Aug. 17? You state, "the owners of non-coking coal will welcome anyone who can show them a feasible method of up-grading the smaller coals of this character."

During three years' enquiry I have not only failed to find a colliery owner with the faintest interest in low-temperature carbonization or in the up-grading coal, but have also failed to find any colliery interested in selling coal for that purpose except on more onerous terms than are asked from any other type of consumer.

It is perhaps characteristic of our national habit of slow starting that those operating low-temperature plants have enquiries and visits from representatives of colliery interests in almost every country in Europe, except those of our own where the prosperity of the coal industry is vital. Factors, coal merchants, and exporters, tar-distilling concerns, and to a lesser extent the Gas Industry show signs of interest, but not the producers of coal.

It is somewhat pathetic to look through the monthly Bulletin of the British Coal Utilization Research Association and note that for every item showing an advance in the treatment or use of coal derivatives in Great Britain there are at least ten items relating to other countries.

At the end of your article it is stated: "It can be anticipated that this development will receive approval, and perhaps the tangible approval, of the Government." On the contrary, the utterances of the Government spokesman, the Secretary for Mines, shows that if not actually opposed to the production of smokeless fuel, it is certainly regarded as of no assistance to the coal industry on the ground that owing to the greater heating efficiency of 25%, the amount of coal raised will not be increased; ignoring the fact that the production of 20 cwt. of smokeless fuel requires from 30 to 32 cwt. of coal. And while France and Germany subsidize, grant a reduction of licence fees and other privileges to owners of motor vehicles driven on solid fuel, our own Government even refuses to modify the present regulations which act unfairly against the use of such vehicles. The Ministry of Transport only last month refused to make any concession even though no loss of revenue was entailed.

The distributors, both for inland and export trade, see the possibilities, but they can do nothing without supplies.

Yours, &c.,
"INDUSTRIALIST."

Aug. 19, 1938.

Personal

Mr. JOHN DICKSON, who for some years has been on the staff of Haddington Gas Company, has been appointed Distributing Engineer with the Linlithgow Gas Company.

* * *

Mr. W. H. JOHNSON, who was for 14 years with Kirkcaldy Corporation Electricity Undertaking as Charge Engineer, has been appointed Sales Manager for Scotland for Messrs. Clough (Croydon), Ltd., in place of Mr. E. V. Craig, who has resigned from that position.

Obituary

The funeral took place at Highweek Churchyard, Newton Abbot, on Aug. 19, of Mrs. ALICE CLARK, wife of Mr. Joseph George Clark, of Penns Mount, Kingsteignton. Mr. Clark is Managing Director of the Newton Abbot Gas Company.

* * *

The death occurred on Aug. 18 of Mr. ERNEST WILLIAM SMITH, Chairman of Smith Meters, Ltd., and a Director of United Gas Industries, Ltd. The funeral took place yesterday at Highgate. An obituary notice will appear in our columns next week.

News of the Week

The Calorific Value of the gas supplied by the March Gas and Coke Company, Ltd., from the first day of October next will be 470 B.Th.U. per cu.ft.

A Branch Showroom in London Road, Poynton, will be opened by the Stockport Gas Department on Saturday, Aug. 27. The ceremony will be performed by His Worship the Mayor, Councillor H. Shepherdson.

Applications are Invited by the Rochdale Corporation for the position of Assistant Engineer and Manager to the Gas Department at a commencing salary of £450 per annum, rising by annual increments of £25 to a maximum of £550 per annum. Further particulars of the situation will be found in our advertisement columns.

The Institute of Vitreous Enamellers, in collaboration with the British Cast Iron Research Association, has appointed Dr. G. T. O. Martin as Officer of Research to conduct investigations and experiments in connexion with the application of vitreous enamel to cast and sheet iron. His activities will be controlled by a joint committee, representative of both organizations.

For the First Time, it is claimed, a gas-operated wireless set will be shown under working conditions at the National Radio Exhibition at Olympia, which will be opened to-day and will continue until Sept. 3. Mr. H. R. Milnes, of Messrs. Milnes Electrical Engineering Company (Bingley), Ltd., Victoria Works, Church Street, Bingley, invented the thermo-electric generator supplying the set.

A Number of New Gas Cookers stored behind the showrooms in Market Street, Farnworth, near Bolton, Lancashire, caught fire on Aug. 17, and were extensively damaged before the flames were put out by the Farnworth Fire Brigade. The cookers were packed with paper and straw in wooden frames, and the fire is thought to have been caused by a spark from some rubbish which had been burned nearby.

A Reduction in the price of gas is announced by the Ellesmere Urban District Council of 5d. per 1,000 cu.ft.

Mr. J. H. Wilson, of Messrs. George Wilson's Gas Meters, Coventry, who is commander of the "B" Division of the Coventry Special Constabulary, has presented to the Coventry Police Force a silver cup to be competed for annually in an angling competition. The first competition took place on Aug. 21 at Mr. Wilson's home, Baginton, in private waters there. The competition was between the city police and special constables. The policemen won the competition easily by more than 10 lb.

First-Class Instruction in Cookery has been provided by the Newport (Mon.) Gas Company for members of Newport Voluntary Aid Detachment. Miss D. M. Stewart (Diplomée, Edinburgh College of Domestic Science), cookery demonstrator to the Company, conducted the course. The five members who took the examination passed with a high percentage of marks. The tests were sent from the Society's headquarters in London, and the examination (written and practical) was conducted by Miss E. W. Rees (Board of Education Diplomée in Domestic Science), who complimented the candidates on the high standard of their work.

The Public Lighting of Caerleon, known to the Romans as *Isca Silurum,* has been greatly improved by the Newport (Mon.) Gas Company, who have provided what is practically a new installation. The Company's contract with the Caerleon District Council was due to expire next year, and preliminary talks, to which reference was made recently in the "JOURNAL," regarding a renewal of the contract led to agreement on the new scheme. This provided for an increase in the number of lamps, each unit being of modern design and giving 100% more light than previously obtained. As a result of the negotiations a contract has been secured for a period of fifteen years. The *Daily Mail* states that Caerleon claims that it will have the best street lighting of any town in the United Kingdom when the new installation is brought into use.

Forthcoming Engagements

[*No meeting of the Central Executive Board of the National Gas Council or of the Central Committee of the Federation of Gas Employers will be held during August.*]

September.

5 to 8.—A.P.L.E.—Annual Conference at Bournemouth.
8.—North British Association.—Annual Meeting at Largs.
10.—Junior Gas Association.—Joint Visit to Empire Exhibition, Glasgow.
12.—I.G.E.—Research Executive Committee, 2.30 p.m.
12.—L.C.C.A.—Technical Committee, 11.30 a.m.
13.—N.G.C.—Central Executive Board, Gas Industry House, 2.30 p.m.
15.—I.G.E.—Finance Committee (instead of Sept. 13), 1.45 p.m.; Membership Committee (instead of Sept. 13), 2.15 p.m.; General Purposes Committee, 3 p.m.; Refractory Materials Joint Committee, 2.30 p.m.
15.—S.B.G.I.—Council, 2.30 p.m.
15.—Wales and Mon. Association.—General Meeting at Porthcawl.
20.—I.G.E.—Gas Education Executive Committee, 2.30 p.m.
22.—I.G.E.—Gas-Works Safety Rules Committee, 2.30 p.m.
23.—I.G.E.—Joint Lighting Committee, 2.30 p.m.
26.—L.C.C.A.—Finance Committee, 10.45 a.m.; Executive Committee, 11.15 a.m.; Central Committee, 2.30 p.m.
28.—I.G.E.—Pipes Committee, 2.30 p.m.
30.—I.G.E.—Liquor Effluents and Ammonia Committee, 11.15 a.m.; Joint Research Committee, 2.30 p.m.

October.

1-4.—B.C.G.A.—Annual General Meeting and Conference at Brighton (for Programme see p. 34 of "JOURNAL" for July 6).
6.—I.G.E.—Research Executive Committee, 2.30 p.m.
7.—I.G.E.—Joint Committee on Complete Gasification Under Pressure (16, Old Queen Street, S.W. 1), 3 p.m.
7.—Southern Association (Eastern District).—Meeting at Gas Industry House, 2.30 p.m. Discussion on A.R.P.
10.—I.G.E.—Finance Committee, 1.45 p.m.; Membership Committee, 2.15 p.m.; General Purposes Committee, 3 p.m.; Benevolent Fund Committee of Management, 4.30 p.m.
11.—I.G.E.—Council, 10 a.m.
12.—I.G.E.—Board of Examiners, 2.30 p.m.
13.—Midland Association.—Autumn General Meeting, Grand Hotel, Birmingham.
18.—I.G.E.—Gas Education Executive Committee, 11 a.m.; Gas Education Committee, 2.30 p.m.

November.

1.—I.G.E.—Council, The Institution of Mechanical Engineers, 9.30 a.m.; Council (continued), the Institution of Mechanical Engineers, 4.30 p.m.
1-2.—I.G.E.—10th AUTUMN RESEARCH MEETING at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, London, S.W. 1.

Athletic and Social

Edinburgh Bowls.

An interesting bowling tournament for the Jamieson trophy was played recently on Roseburn Green, Edinburgh, the competitors being Granton Gas-Works and Edinburgh Gas Distribution, and it ended in a win for the latter by 52 shots to 34.

South-Eastern Gas Companies' Tennis Tournament.

The results of the first and second rounds are as follows:

First Round.
Hastings, bye.
Whitstable, bye.
Tunbridge Wells, 1; Dover, 6.
Folkestone, 2; Rochester, 7.

Second Round.
Hastings, 2; Rochester, 5,
Whitstable, 2; Dover, 6.

Final (to be played).
Rochester *v.* Dover.

New Showrooms for Portsmouth Company at Cosham

To meet the increasing demands which the phenomenal growth of the district during the past few years has made upon the Undertaking, the Directors of the Portsmouth and Gosport Gas Company have provided in Cosham a local centre of operations from which to serve their 10,000 consumers in that area.

The new premises, consisting of a spacious showroom, demonstration theatre, extensive and well-equipped stores and workshops, together with a flat for a resident Inspector, were officially opened on Friday by Mrs. T. Carmichael, wife of the General Manager of the Company.

The site is a splendid one, being situated in the principal shopping centre; and the Company's Architect (Mr. Ernest J. Thomas, F.R.I.B.A.), incorporating a layout arranged by the Directors of the Company, has designed a building which conforms in style to the general characteristics of modern tastes and requirements. The exterior of the premises presents a pleasing and dignified appearance, its brick and stone finish merging happily with that of the surrounding properties. The General Contractors were Messrs. Frank J. Privett, Ltd., of Portsmouth, assisted by a number of specialist sub-contractors.

The main entrance gives access to the showroom, fronting on the High Street, the windows of which are of the "open" type, so that the whole of the interior can be seen from the pavement. The colour scheme of the interior is in delicate pastel shades, harmonizing tastefully with the light oak woodwork, while indirect lighting is employed to bring out the natural warmth of the colours.

An Attractive Display.

On entering the showroom it is immediately apparent that no effort has been spared to make an attractive display. The growing realization of the need for more colour in the home is evidenced by the many attractive finishes to be seen on every side. The latest types of cookers, in all-enamel finishes are on view, while modern gas fires in beautiful panel surrounds indicate the fact that gas heating extends to the whole fireplace and not to the heating unit alone. The ample space available has enabled the gas fires and settings to be treated individually and studied separately by purchasers looking for something to harmonize with their particular decoration scheme. The display of water heaters is noteworthy. Upon a black back-panel in an alcove is mounted a range of different types of heaters, which discharge into a stainless steel trough. Their respective efficiency can be readily observed and tested with the aid of the direct-reading thermometer which is mounted on the back-panel alongside the heaters.

Lighting is by means of ceiling lamps, with which an ingenious arrangement of ventilating ducts is incorporated, while grills around the central laylight also assist in maintaining comfortable atmospheric conditions. The same system is adopted in the demonstration room.

The warming of the entire premises is carried out by gas, and, as a working exhibit in an alcove adjacent to the water heating display, is the Potterton central heating boiler in pleasing cream enamel finish and complete with automatic controls and recorder. This boiler is thus available for inspection at all times and provides excellent testimony to the cleanliness of gas.

For the convenience of customers, provision has been made for the payment of accounts and for transacting other business in the new showrooms. To reach the cashier's counter, consumers will pass through the showroom, and an excellent opportunity is therefore provided for the inspection of the appliances therein displayed.

To the rear of the showroom are the workshops, stores, and offices, covering an area of approximately 5,000 sq.ft., with ample natural light. In the design of these workshops and stores plenty of accommodation has been provided for maintaining an adequate stock of appliances. Overhead heating pipes are provided in the stores, thus economizing floor space, while in a corner is a large gas storage water heater supplying the cloakrooms.

Demonstration Theatre.

On the upper floor, and immediately above the workshops, is the fine demonstration theatre, which has been designed to seat 175 persons in comfort. The main staircase, finished in Terazzo, gives access to the theatre from the showroom. Attractive wall brackets serve to show how effectively gas lighting fits in with the most modern treatment of interior decoration. The demonstration stage is laid out as a fully-equipped modern kitchen, with the addition of a large-dial meter to record the gas consumed during the various processes demonstrated. It is proposed to hold regular lectures here throughout the year.

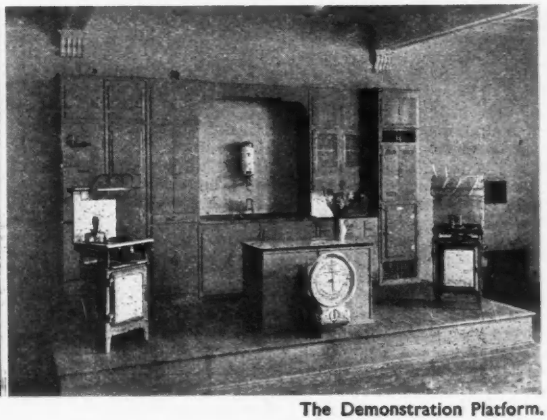
The remainder of the upper floor takes the form of a flat for the resident Inspector, whose duty it is to take night calls and attend to any complaints which may arise after ordinary business hours.

In addition to the new showroom staff, a special staff of fitters will now operate direct from the Cosham workshops and stores, instead of from Rudmore as hitherto—thus ensuring a speedier and more efficient service to the local consumers.

THE OPENING CEREMONY.

The opening ceremony was preceded by a reception in the new showroom, when Mr. F. E. Beddow, D.Sc., Ph.D., J.P. (Chairman of the Company), extended a cordial welcome to a gathering numbering some 130 persons. He was supported by his Co-

General View of Interior.



The Demonstration Platform.

Directors—Mr. Thomas Carmichael, Capt. R. J. E. Baker, Mr. W. H. Bennett, and Mr. F. Kilpatrick—and by senior officers of the Company, including Mr. R. W. Hewitt (Secretary), Mr. E. Allison (Engineer), and Mr. A. J. Garward (Sales Superintendent), while among those present were Mrs. Carmichael, Sir Harold and Lady Pink, and a large number of Councillors and prominent local residents.

Dr. BEDDOW expressed his pleasure at seeing so many present on that occasion to witness the opening of their new premises. When they had inspected the building, they would realize that it was worthy of Cosham. Within a few years the population of Cosham had grown from a thousand to ten times that figure, and they had yet developed only about half the area. The Directors of the Gas Company were looking forward to tremendous development of business during the next few years, and it was their desire to do all they could to assist in increasing the trade of the district.

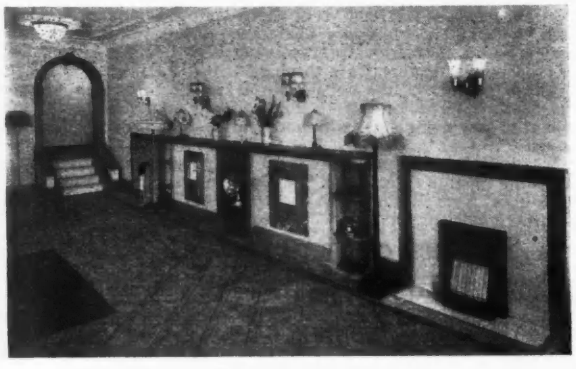
The new premises were thereafter formally declared open by Mrs. CARMICHAEL, who, in a charming little speech, expressed her pleasure at being invited to take part in the ceremony and congratulated the Company on providing in Cosham such a handsome building which would be of great service to the ladies of the district. In declaring the showrooms and workshops officially open, she voiced the hope that they would prove of benefit to both consumers and Company.

Guests of the Company.

After an inspection of the premises, those present were entertained at luncheon at Kimbell's Café, Cosham—Dr. BEDDOW presiding.

The Loyal Toast having been honoured, the CHAIRMAN observed that this was a red-letter day in the history of the Company. For that reason they very much appreciated the presence of their guests to combine with them in opening these new premises. Those present that day were those who had taken the most active part in the life of Cosham and in the development of the district. Cosham had grown by leaps and bounds in recent times, and he was convinced that that growth would go on, for so far they had only developed one side. The Directors fully realized, when they put up their new showrooms, that Cosham must have the best, and he hoped it would be recognized that they had tried to do their utmost in this respect. He hoped that the people of Cosham would make the very best use of the new premises and give the Company the opportunity of helping them as much as they could.

The new premises were divided into three sections—first the showroom, which, he thought, set an example to the tradespeople



An Attractive Gas Fire Display

of the district. It was essential that they should have a large showroom. Twenty years ago a small one was sufficient because they had very little to show; but to-day there were many manufacturers employing scientists, chemists, and artists to make gas appliances as efficient and beautiful as possible. Therefore they had to have a large showroom in which to display the considerable range of appliances now available. The second section was the demonstration room, where one of the Company's demonstrators would always be on duty to give advice. There was on the platform a gas meter with a large dial showing the actual cost of the gas consumed. That stood for something the Company were most anxious to encourage—namely, to show consumers how to economize in every possible way and how to cook a full meal with the lowest possible gas consumption. The third section was the workshops and stores where fitters would always be on the spot, thus enabling consumers to have the best service with the least delay. In conclusion, the Chairman paid tribute to all those who had taken part in the erection of the new building, including their own staff, of whom he mentioned particularly Mr. Garward and Mr. Privett.

Proposing the Toast of "Our Guests," Mr. THOMAS CARMICHAEL said he was delighted to have the privilege of associating himself with the very cordial welcome which the Chairman had extended to all their guests. He was very pleased indeed that so many had found time to come along and view the new premises; he hoped they were all satisfied with them. This new depôt would enable the Company to give efficient service without delay, which he hoped would be appreciated by the residents of the neighbourhood. Mr. Carmichael regretted the unavoidable absence of the Lord Mayor, but welcomed the presence of Sir Harold Pink and many other leading townspeople. After referring in turn to other of their guests, Mr. Carmichael went on to remark that the development of the neighbourhood was largely due to the builders, who were to be congratulated on installing in their houses the most modern appliances. In conclusion, Mr. Carmichael said they were very proud of their staff at Portsmouth, and he introduced in turn to those present the personnel attached to their new branch at Cosham. In proposing the Toast, he observed that the presence of their guests on that occasion was evidence of the goodwill which existed between the Gas Company and the commercial and social community of Cosham.

Among those present at the Opening Ceremony—including the Chairman, Dr. Beddow (second from left), Mr. Thomas Carmichael, and Mr. W. H. Bennett.

Sir HAROLD PINK was the first to respond on behalf of the guests. He thanked the Directors of the Company for their hospitality and for the opportunity of inspecting the new showrooms. They were all very delighted at the Company's progress and at the fact that they had followed the lead of two or three others in re-building their premises in Cosham. When the Company appointed Dr. Beddow as their Chairman they did an excellent day's work, for no better choice could have been made than a gentleman so closely acquainted with science. Sir Harold went on to refer to the progress which the Company had made during recent years—including other undertakings which they had taken over. While shareholders and consumers had good cause to be satisfied with the Chairman and Directors, they must not forget Mr. Carmichael, who had done wonderful work since he joined the Company, Mr. Hewitt, Mr. Allison, and Mr. Garward, as well as others who had worked very hard to provide the best possible service for their customers. A few years ago, continued Sir Harold, it was thought that the days of the Gas Industry were numbered; but actually the Industry was doing better and better each year. Finally, he congratulated the Portsmouth Company on the position they held, and the Directors and staff on the wonderful work they had done in the past—with the sincere hope that they would have a prosperous future before them.

Councillor H. T. CLIFTON and Mrs. A. E. M. OLIVER also responded on behalf of the guests. The former mentioned the splendid work Mr. and Mrs. Carmichael were doing in Cosham, while the latter referred to Mr. Carmichael as one of the outstanding personalities of the Gas Industry, and remarked that his recent appointment as a Magistrate was welcomed throughout the City.

Presentation to Mrs. Carmichael.

The CHAIRMAN then made a presentation of an inscribed silver salver, the gift of the Board of Directors, to Mrs. Carmichael

as a mark of their appreciation of all she had done. The Directors had felt for a long time, he said, that Mrs. Carmichael had been extremely helpful to them. They relied upon her for a great deal of assistance, and they thought this would be a fitting opportunity to make her a little presentation on behalf of the Directors in recognition of her services to the Company.

In returning thanks for the gift, Mrs. CARMICHAEL said that anything she had been able to do in the past had been a real pleasure, and she greatly appreciated this memento of the occasion and the very kind references the Chairman had made to herself.

The Toast of "The Portsmouth and Gosport Gas Company" was proposed by Mr. L. GLANVILLE. They had had the opportunity that day, he observed, of seeing an example of their enterprise. One word stood out as the motto of the Company—that was, "Progress." The Gas Industry in Portsmouth originated in the year 1821, and since then the Company had extended in every possible direction until to-day it covered a very considerable area and served many industries as well as their domestic consumers. There must be a driving power behind all this to make the organization really effective, and that was where they came to the Directors. They all upheld the traditions of well-known Portsmouth men. He congratulated them on their enterprise and thanked them for their hospitality, and they all hoped the day was not very far distant when the Board would see even greater progress. He coupled with the Toast the names of the Chairman, Directors, and officials of the Company.

Mr. F. KILPATRICK responded to the Toast, thanking the proposer for his remarks and all their guests for their presence. The Portsmouth Company, he said, was among the largest in the country; actually, he believed they ranked eleventh or twelfth in size. Their works—of which there were four—were being continually modernized, and it was their aim to keep them all in the highest state of efficiency. Their sales and service sides were also being continually extended. They who were membrs of the Company were very proud of their association with it, and the Board appreciated very highly the work of what he might call the executive personnel, who were of such prime importance in their welfare and progress. Once again he thanked their guests for their presence and for their kind wishes. He could assure them that the Company would do their utmost to deserve their confidence.

Public Works, Roads, and Transport Congress and Exhibition, Nov., 1939

Prizes for Papers Contributed to the Congress

The Council of the Public Works, Roads, and Transport Congress have decided to award the following prizes for papers which are submitted for discussion at the Congress to be held in November, 1939:

1st Prize.—Gold Medal and 100 guineas.
2nd Prize.—Silver Medal and 50 guineas.
3rd Prize.—Bronze Medal and 20 guineas.
4th Prize.—10 guineas.

The subject of the paper must be one which is covered by the objects of the Congress, among which are gas and public lighting.

Full particulars of the competition and a list of suggested subjects for papers can be obtained on application to The Secretary, The Institution of Gas Engineers, 1, Grosvenor Place, London, S.W. 1.

Price Reductions at Hamilton

At the meeting of the Hamilton Town Council last month it was decided to adopt the following increase in rebates on gas charges to consumers within the Burgh:

To ordinary consumers—

	Cu.Ft. per Quarter.	Per Therm.	Per 1,000 Cu.Ft. s.	d.	Equiv. to Disc. %
For consumptions up to	7,000	7·39d. or	2	8½	
" " over	7,000 to 34,000	6·65d. or	2	5·25	10
" " "	34,000 to 750,000	6·28d. or	2	3·63	15
" " "	750,000 to 1,000,000	6·09d. or	2	2·81	17½
" " "	1,000,000 to 1,250,000	5·91d. or	2	2	20
" " "	1,250,000 to 1,500,000	5·72d. or	2	1·19	22½
" " "	1,500,000 to 1,750,000	5·54d. or	2	0·38	25
" " "	1,750,000 to 2,000,000	5·35d. or	1	11·56	27½
" " "	2,000,000 to 2,250,000	5·17d. or	1	10·75	30
" " "	2,250,000 to 2,500,000	4·98d. or	1	9·94	32½
" " "	2,500,000 to 2,750,000	4·80d. or	1	9·12	35
" " "	2,750,000 to 3,000,000	4·61d. or	1	8·31	37½
" " "	3,000,000 to 3,250,000	4·43d. or	1	7·50	40
" " "	3,250,000 to 3,500,000	4·25d. or	1	6·69	42½
" " "	3,500,000 to 3,750,000	4·06d. or	1	5·87	45
" " "	3,750,000 to 4,000,000	3·88d. or	1	5·06	47½
" " "	4,000,000	3·69d. or	1	4·25	50

Consumptions in separate premises by the same consumer are not combined for the purpose of chargir.r.

To prepayment consumers—

	Cu.Ft. per Quarter.	Per Therm.	Per 1,000 Cu.Ft. s.	d.	Equiv. to Disc. %
For consumptions up to	7,000	8·29d. or	3	0½	
" " over	7,000 to 125,000	7·46d. or	2	8·85	10

The rebates in accordance with above scheme will be allowed in the following accounting periods: September-December, December-March, and March-September (reckoned as one quarter).

Gas Lighting in Liverpool

Meter Testing Results

Mr. P. J. Robinson, Lighting Engineer to the Liverpool Corporation, states in his Annual Report that of the 950 miles of streets and passages which are lighted by the municipality, 585 miles are gas lighted. There are 15,476 gas lamps in use for street lighting. The price of gas is 7·6d. per therm less 20% or 2s. 4·88d. net, when the consumption is 850,000 therms and upwards per annum.

In the section dealing with gas meter testing it is reported that the number of gas meters tested during the year was 35,368, of which 19,074 were submitted by the Liverpool Gas Company, 11,558 by J. H. Robinson & Co., and most of the remainder by the Corporations of Birkenhead, Southport, and Wigan. Of the dry meters, 8,822 were approved and 434 rejected; wet meters, 1,691 approved and 59 rejected; prepayment meters, 23,566 approved and 796 rejected. Mr. Robinson adds that gas costs 3·866d. per candle per annum.

Competition Judged at Radiation House

The *Daily Mail* has been running a recipe competition in connexion with Apple Juice, and again asked Radiation to cook these recipes in the kitchen at Radiation House and also to stage the judging for the competition. This little ceremony took place on Aug. 18 at Radiation House, and the following acted as judges: The Hon. Mrs. John Bingham, Miss Janet Bond, of the Canned Food Advisory Bureau, Mr. Raymond Massey, and Miss Tamara Geva. The "New World" cooker was used for all these recipes, and the quality of the cooking was very highly praised. Our photograph was taken at the judging of the competition.

Solid Smokeless Fuel

Its Production, Preparation, Utilization, and Characteristics

A Paper read at the Annual Meeting of the Irish Association of Gas Managers held at Dublin on Aug. 9.

By M. BARASH, Ph.D., M.Sc.Tech., F.I.C.,
Head of Research Department, West's Gas Improvement Company, Ltd.

When your worthy President, Mr. Arnold Law, honoured me in April by asking me to present this Paper I very gladly accepted, and took the earliest opportunity to visit him and several other of my good friends of your Association in order to ascertain the position in Ireland with regard to the subject of this Paper as compared with the general position in the British Isles.

I was not surprised to find, in view of the close relationships on the two sides of the Channel, and in view of the mutual associations with regard to coal supplies, carbonizing installations, potential markets, and the existing competition, that although obviously on a smaller scale, the problems of the production, preparation and utilization of a satisfactory, solid, smokeless fuel in Ireland may justifiably be taken as part and parcel of the general study of the subject. This is my only apology for dealing with the subject on a broad general basis and making reference to local conditions in one or two cases only where particularly relevant.

Introduction.

There is no doubt that there is a definite, immediate, and potentially increasing demand for a supply of solid, smokeless fuel for domestic as well as a host of industrial purposes.

For a material to satisfy a meticulously true definition of the phrase "solid smokeless fuel" one would justifiably expect such a fuel to be (*a*) solid, that is as far as possible free from dust which behaves as a fluid, (*b*) entirely smokeless under all conditions of combustion, and (*c*) as ash and moisture are incombustible a fuel by definition should be as free as possible from them. In addition, of course, the fuel must not only have attractive combustion properties from the point of view of ignitability and reactivity but it must also be economically, freely, and readily available. There is no doubt, from the knowledge and experience at present available, that gas-works coke, if not already so, is potentially the fuel most nearly approaching this definition.

Two fuels closely akin to gas-works coke in their appeal are coke-oven coke and low-temperature coke. Oven coke, which under the modern carefully controlled conditions of production can become a very close and serious competitor to gas coke falls short in that particularly for domestic fuel requirements its combustion properties generally do not compare favourably with gas coke, and in that it is not as freely available, as it is largely controlled by efforts to dispose of surplus production incidental to vagaries in conditions in the iron and steel industries. Low-temperature is far from being a serious competitor to gas coke while low-temperature carbonization processes are still generally in their present technically and economically unproven condition.

In Ireland, apparently, neither of these competitive fuels has yet gained any appreciable foothold in the field of utility enjoyed by gas coke, but the problem is almost certain to arise, if it has not already been felt, of making the local product so attractive as to oust its potential rivals. It is intended in this Paper to indicate the lines on which progress has and is being made towards the impregnable position of the gas coke market, and to relate the properties and potentialities of this and competitive fuels.

Production and Characteristics of Gas Coke.

At the present time some 8 to 9 million tons of gas-works coke are sold annually in the British Isles, the chief uses of which are:

(*a*) Domestic fuel in open grates, closed stoves, and domestic boilers.
(*b*) Industrial purposes, heat treatment, drying processes, steam raising, vehicular traction, &c.
(*c*) Central heating of houses, institutions, and industrial buildings.

In competition with this gas coke, the quantity of oven coke sold in the gas coke markets has reached about four million tons, while it has been stated that this figure could readily be increased to six million tons if conditions in the iron industry returned to normal.

It has been shown by Dr. Margaret Fishenden in researches on domestic heating that gas coke, if low in ash and moisture, is an excellent domestic fuel. Her experiments showed that the radiant efficiency of dry coke is 24·5% and 28·5% as compared with 21% and 24% for coal burnt in the same grates, but that this efficiency was seriously reduced as the moisture content of the coke increased.

A considerable amount of investigation has been carried out and published, during the last 20 years, on the preparation of coke as a smokeless fuel. No better source of information can be recommended on the comprehensive subject of the production, preparation, and utilization of coke than the collection of "Coke" prize-winning Papers in the World Coke Competition organized in 1925 by the "Gas Journal" (Coke Competition Number, Nov. 9, 1925).

The present position is still almost exactly as it was then summarized as follows:

(1) There is definite and immediate demand for a supply of solid smokeless fuel for domestic as well as industrial purposes.

(2) For this supply to meet with success, the fuel
  (*a*) must be sold on a competitive basis with coal,
  (*b*) must be readily combustible and easily ignitable,
  (*c*) must not cause the user extra trouble with ash, clinker, or smell, and
  (*d*) must be readily and regularly available.

(3) The supply of solid smokeless fuel may be obtained by various processes, according to local conditions, but it appears likely that the already established gas and coking industries will be the suppliers of the bulk of this fuel whether produced by high or low-temperature processes.

(4) Low-temperature processes are still both technically unproven (with possibly one exception, the "Coalite" or essentially the original "Parker" process).

(5) A satisfactory coke can be obtained from already existing carbonizing plants if adequate attention is paid to the three essential conditions, dryness, low ash content, and suitable grading.

(6) Dry coke can be obtained by several processes:
  (*a*) From continuous vertical retorts by quenching the coke in the retorts with steam.
  (*b*) From intermittent processes by quenching with steam, with cold inert gases, or with a carefully controlled limited amount of water.

(7) The grading of coke merits close attention and the standardization of coke-grading sizes is very desirable.

(8) The production of low ash content coke frequently involves some pre-treatment of the coal by a cleaning process, either by dry methods or by washing followed by drying.

(9) High-temperature coke can frequently be improved by modification of the physical condition—*e.g.*, by the development of a fine, cellular, thin-walled structure, as may be produced by suitable coal blending.

(10) Blending of coal has the following advantages:
  (*a*) It renders the coke more combustible and more easily ignitable.
  (*b*) It gives a more compact fuel.

(*c*) It renders available as potential smokeless fuel materials otherwise unsuitable (non-coking coals, too highly coking coals, coke breeze, and dust, &c.).

(*d*) It produces a more uniform, controllable product.

Types of Carbonizing Plant.

The methods of production of coke involve a multiplicity of different kinds of plant regarding which only a very brief survey of the more important types can be attempted here.

(*a*) *Continuous vertical retorts* account for about 50% of the coke production of the Gas Industry. The coke contains only about 1% of moisture and 2% of volatile organic matter as discharged; it is comparatively light and porous, and is generally admirably suited for domestic use as well as for general purposes.

(*b*) *Horizontal retorts* still form a large proportion, probably 40% of gas-works carbonizing plant. With heavy charges they produce a large coke, though not as dense as from the intermittent systems mentioned below and fairly low in reactivity. With light charges they produce a smaller, softer coke which burns more readily, though it is rather unprepossessing in appearance owing mainly to the water quenching which is still normally carried out.

(*c*) *Inclined Retorts.*—There are still a few installations of inclined retorts in the Gas Industry, but they are of little importance and certainly in disfavour as carbonizing plant.

(*d*) *Coke Ovens and Chamber Ovens.*—These large units are exceptional in the Gas Industry, and the few installations which have been put down by the largest gas undertakings have been built for special local demands. Of all carbonizing plant, they produce the largest, hardest, and densest coke, least suitable for the important consumer, the domestic load. Incidentally, there has been, prior to the recent industrial activity in the metallurgical world, a serious attempt by the coke oven industry to invade the gas coke market by regulating the coals and carbonizing conditions in coke ovens to produce a lighter and more reactive competitive coke.

(*e*) *Intermittent Vertical Retorts.*—These come next to ovens in the size and density of the coke made. This fairly modern gas-works development aims at combining the features of intermittent systems (the production of a harder, denser coke), with the obvious advantages of the continuous vertical retort (the discharge of a cool reactive coke), and the utilization of the flexibility and enhanced productivity attributed in the main to the process of "steaming" the charge during carbonization.

(*f*) *Low-temperature carbonization* processes have been exhaustively investigated by a number of the larger gas undertakings, but none has so far reached the point of large-scale adoption on any gas-works, with possibly the one exception to which reference has already been made.

Progress of Continuous Vertical Retorts.

In view of the undoubted preference which is being shown in the Industry for the adoption of the continuous vertical retort as the gas and coke producing plant, on practically all but the smallest installations, it is interesting to give a brief indication of the extent of this comparatively recent development compared with the parent horizontal retort practice. The following figures have, therefore, been summarized from available authoritative publications of the returns of gas undertakings for 1937.

The figures have been analyzed in detail for Ireland and Scotland, in both of which there is naturally a considerably larger domestic than industrial load as compared with England and Wales. For England it is practically impossible to obtain an accurate analysis for various reasons; but it has been authoritatively stated several times recently that in the British Isles continuous vertical retorts are responsible for over 60% of the gas produced in the Industry.

The figures for Ireland are:

Gas Production.	Continuous Verticals.	Horizontals.
Number of installations	11	50
Total annual make, million cu.ft.	5,671	1,295
Average make per installation, million cu.ft. ..	515	26
Percentage of total (V + H) make	81·4	18·6

The figures in each case include a proportion of water gas, made at some of the works where the actual carbonizing plant is either verticals or horizontals. One large installation, where both systems are in use, is not included in the foregoing.

The figures for Scotland are:

Gas Production.	Continuous Verticals.	Horizontals.
Number of installations	59	116
Total annual make, million cu.ft.	17,578	2,959
Average make per installation, million cu.ft. ..	298	26
Percentage of total (V + H) make	85·6	14·4

The figures in each case include a proportion of water gas made at a number of the works where the actual carbonizing plant is either verticals or horizontals, and there is not included one of the largest installations in the country where both systems are in operation.

A fairly similar coke production comparison can be deduced if in the above figures an allowance is made of, say, 14 cwt. of coke made for every 13,000 cu.ft. of horizontal gas and 13 cwt. of coke made for every 16,000 cu.ft. of vertical gas.

Vertical Retort Coke.

From two authoritative sources in the Coke Competition Papers it is stated that coke produced from continuous vertical retorts, when suitably graded, has marked qualities which render it specially suitable for use as a domestic fuel. E. W. L. Nicol states: "The most remunerative market for coke brings it into direct competition and comparison with house or 'parlour' coal, as used extensively in open firegrates. Vertical coke unquestionably gives results, especially in firegrates of the older type, which are unattainable with denser kinds of coke burned under the same conditions. Comparatively light, and uniformily dry, vertical coke gives quicker ignition and freer combustibility." And further referring again to vertical retort coke: "It is an interesting fact to record that the undertakings which have made the most progress in the development of a domestic coke market are building up the market on this type of coke; undoubtedly due in the main to suitable grading and low moisture content."

It is also interesting, for comparison and reference, to give the authoritative point of view of the producer in connexion with the utilization of oven coke. G. W. J. Bradley, President of Coke Oven Managers' Association (1938), has recently declared that the various types of coke need definition in relation to present and potential markets. His point of view was that whereas, for example, Durham coke has a great reputation for furnace purposes, while Derbyshire coke is considered to be soft and of less value, nevertheless, in the gas coke market, the values are reversed. There is thus the dual conception to be considered of not only

(*a*) the chemical composition of the cokes as defined primarily by ash and moisture content, but also

(*b*) the fundamental character of the coke produced, depending upon the class of coals used and the method of carbonization; these being additional and primary considerations before the equally important one of the preparation of the coke for the market (by cleaning, grading, &c.) after its production.

Coke Quenching.—Although the cooling or quenching of coke immediately prior to or subsequent to discharge from the carbonizing system is necessarily a part of the process of carbonization, the methods involved in effecting this quenching have a fundamental influence on the resultant coke and its further preparation.

Wet quenching should be avoided as far as possible. The fallibility of the human element makes it extremely difficult to ensure that only the minimum of water is added to the coke on discharge to avoid firing in storage, and at the same time to avoid over-wetting. The consumer is naturally averse to paying up to 40s. per ton for water—and apart from this, the disadvantages of excessive moisture in coke during its combustion are fairly obvious.

Dry quenching may be carried out either (1) by "steaming" before discharge, as is universally practised in vertical retorts, with the obvious advantages of returning the heat into the carbonizing system and avoiding the nuisances associated

with external wet quenching; or (2) by circulation of inert gases over the discharged coke in containers and then through boilers to raise steam as in the Sultzer and similar processes.

Coke Grading.—The importance of grading of coke is evidenced by the strictly defined uses recommended for the various grades by notable authorities, and by the frequent references to its absolute necessity by all investigators.

The standard grading adopted by the London Coke Committee was simply into four sizes:

Large coke, remaining on a 2 in. screen.
Domestic coke, through 2 in. and remaining on ¾ in.
Coke nuts, through ¾ in. and remaining on ⅜ in.
Coke breeze, all below ⅜ in.

This has apparently later been somewhat modified and resubmitted by the London and Counties' Coke Association as follows:

Large or unbroken coke ..	No. 1 over 2 in. (square mesh).
Broken coke	No. 2 2 to 1 in.
Coke boiler nuts	No. 3 1½ to ¾ in.
Forge beans	No. 4 ¾ to ⅜ in.

Coke Grades and Their Uses.

More elaborate separations have also been suggested, especially in the domestic coke grade, and the following may be taken as a representative grading with the uses to which the various grades are put:

Large coke, over 2 in. mesh, for all branches of metal trade where a fierce heat is required for melting purposes, for glass blowers, bakers' ovens, steam lorries, boiler makers, for large type central heating apparatus for public buildings and theatres, for hotel grills, for river and canal steamers, and for water-gas manufacture.

Small coke, 2 to 1¼ in., is the domestic or household size, and burns well in an ordinary grate. It is an ideal fuel for the old-fashioned range and hot water supply.

Inch nuts, 1¼ to ¾ in., is the size used by smithies, welders, &c., for use on hearths. It is very suitable for anthracite stoves, a stove well filled with such fuel will last 8 or 9 hours and shows a considerable saving in cost compared with anthracite.

Bean breeze, ¾ to $\frac{7}{16}$ in. (or ⅜ in.), is in general use for smiths' hearths and all smaller types of forgings, for gardeners' slow combustion greenhouse stoves, and for garage heating. It also finds considerable use by building contractors in the making of light concrete blocks and floors.

Rough dust, below $\frac{7}{16}$ in. (or ⅜ in.), is consumed in chain grate boilers either alone or, as in the Nicol "Sandwich" system, with cheap coal slacks. It is also used to a limited, though increasing, extent for blending with highly coking coals for carbonization, thus enhancing its value to that of highly priced large fuel. There is always an outlet for it in the surfacing of "cinder" paths, racing tracks, &c.

Coke Screening.—The screening of coke for the production of grades, such as indicated above, is a subject which, if adequately treated, would fill volumes. The types of coke screening plant are legion, their characteristics differ very widely and most of them have their attendant evils. It is intended here to give only some few generalizations as a fleeting review of the subject.

Screening apparatus may be classified into the following groups or types:

(*a*) Bar screens (fixed or moving)—the oldest type, have low capacity and "blind" easily.
(*b*) Rotary screens ("Trommels")—being completely abandoned owing to breakage of coke, dust formation, and high maintenance costs and power consumption for comparatively low capacity.
(*c*) Grills with turning discs or plates ("Grizzley" or "Cataract")—favoured on the Continent and in America, particularly for scalping.
(*d*) Oscillating table screens.
(*e*) Screens with vibrating chassis.
(*f*) Screens with vibrating mesh.
(*g*) Undulating surface screens—a recently developed perforated rubber belt conveyor travelling over an undulating track (of ridges and valleys).

Vibrating screens are perhaps at present in the forefront of popularity.

The most important requirements of a good screening apparatus may be summarized under three headings:

Screening.—The apparatus must give the coke a state of fluidity in transit so that all screenable pieces reach the screen openings easily. "Blinding" of the screening surface should be minimized, and a high screening efficiency should be obtainable up to the maximum rated capacity.

Construction.—The apparatus should be simple and robust. Wearing parts must be easily and rapidly replaceable, particularly the screening surfaces which should preferably be in sections.

In Use.—Maintenance costs must be low. The apparatus should require the minimum of supervision, should occupy minimum space, and should have low power consumption on light or heavy load.

It is impracticable for one piece or even one type of screening apparatus to provide the optimum degree of grading usually required. Generally, two or more types are utilized, each dealing most effectively with the part of the process for which it has been specially designed. The following is an example of a popular and complete layout for a modern screening installation:

(1) De-breezing screen to remove dust up to ¾ in.
(2) Grizzley for scalping off all large coke, say above 2½ in., for subsequent cutting and re-grading.
(3) One or two vibrating screens to grade into, say, four sizes between 2½ and ¾ in.
(4) Final dedusting screen (vibrating) immediately prior to bagging.

Costs of Grading Coke.

The question of costs of grading coke, including maintenance, power, capital, and all attendant charges, has been dealt with very effectively by Mr. W. L. Boon (Manager of the London and Counties Coke Association), in communication No. 114, to the 1935 Annual General Meeting of The Institution of Gas Engineers. These costs naturally vary considerably for the size of works, number of grades produced, &c., but as giving a very rough indication of an average figure, it appears that the total cost of grading, including cutting and screening into 4 grades, is about ¼ of the total cost, about 2s. 3d. per ton, of handling, screening, bagging, and loading of the graded product.

There is no doubt that the steadily increasing popularity and attractiveness of well-graded coke, and the resulting enhanced sales, well merit this expenditure.

Coke Cutting.—Where it is necessary to cut coke into smaller sizes for subsequent screening into commercial grades, numerous types of coke-cutters are available. Obviously, the brutal type of coke "crusher" and coke "breaker," tending to over-production of fines should be avoided, and the "cutting" or "splitting" type preferred.

As is well known, the moisture and ash content of large coke is considerably less than in the naturally produced smaller sizes in run of retort coke. It is, therefore, distinctly advantageous for the production of the best domestic fuel to scalp off the larger size of coke (say, above 2½ in.), and reduce it by cutting and grading to the required sizes.

An additional improvement in the properties of domestic coke due to this cutting of larger sizes is claimed in the enhanced ignitability of the pieces because of sharp fracture surfaces and edges.

Coke Cleaning.—It is obvious that the most effective and economical method of producing a clean coke is by utilizing a clean coal for carbonization. Where this is impracticable, several methods of coke cleaning are available.

Hand picking has been resorted to in some instances, preferably on a travelling belt, particularly for the removal of "bats," shaly pieces, stone and black ends, and has been found to yield a more attractive and readily salable product, and also to eliminate annoying complaints from consumers.

Wet cleaning (or washing) is practised to a limited extent to remove dust, shale, and denser constituents, but this process is to be deprecated as it should, but does not always, involve the subsequent drying of the washed coke.

For dry cleaning there are several types of very effective separators available, notably the gravity spiral separator, and by floating on compressed air over a perforated reciprocating table. These, however, appear to be confined

to large works only, probably owing to high initial costs of installation.

Coke Handling.—Considerable depreciation in appearance of coke and production of excessive breeze may, naturally, result from brutal handling during loading, transport, and transfer from one piece of plant to another. The tendency nowadays is to reduce such depreciation as much as possible —*e.g.*, by the use of rubber band conveyors, spiral chutes, &c. As an example of the amount of breakage which may thus be avoided, the recent installation of cast-iron spiral chutes in one instance for filling coke hoppers, instead of allowing the coke to fall from a height, resulted in a reduction of breeze below ½ in. from 7·5% down to 1·9%, or below ¾ in. from 9% down to 3·5%, that is, a saving of over 1 cwt. of coke per ton handled.

Activation of Coke.—Many methods have been proposed from time to time for the activation of coke after production, in attempts to make it more readily ignitable or more reactive during combustion—*e.g.*, by coating with coal dust (Lloyd, Bell, and Hodsman—Institution of Gas Engineers, Autumn Research Meeting, November, 1933—"JOURNAL" for Nov. 1, 1933), or with small percentages of oils, waxes, &c., and by addition of alkalies, but it is obviously greatly preferable, from simplicity and economic points of view, to effect the desired activity in the coke during its production, or by the selection and pre-treatment of the coal, as will be indicated later.

Too much emphasis cannot be laid on the fact that "A coke well produced is a coke already prepared, and a coke half sold."

Use of Coke in Open Domestic Grates.

A great mass of useful investigation and publications has been carried out during the last 20 years in this most important topic.

The most recent, authentic, and most comprehensive study of the use of coke in the domestic grate is given in the very valuable and useful recent publication of the Fuel Research Board (Technical Paper, No. 46, H.M. Stationery Office, 1937, price 1s. net). I can do no better on this subject than to give a summary of the investigations and results described in this Paper.

In the introduction, it is pointed out that the annual consumption of raw coal for domestic purposes remains fairly constant at about 30 million tons. Much of this coal is used in open grates, in which an appreciable amount of heat is wasted owing to incomplete combustion, and at the same time soot and tarry matter is discharged into the atmosphere. This results in damage to buildings and fabrics, while of even greater concern is the damage to health due to the interception of the actinic rays of sunlight, loss of daylight, and the increase of solid matter in fogs. These deplorable conditions can be avoided by the use of gas coke—the coke produced at gas-works by the normal methods of coal carbonization at high temperatures—readily and widely available. It is a very satisfactory fuel, provided that it is suitably graded, used in grates which are fitted with a gas burner for ignition purposes, and which are provided with means of ensuring adequate draught for combustion.

Even where the grates are not particularly suitable, methods have been successfully evolved, by pre-selection and pre-treatment of the coals and by modified carbonization processes, for the production of cokes of special structure and characteristics, making them readily ignitable and freely burning.

The investigations described were carried out on both the types of grate in common use, the well-type grate and the bar grate, and methods of obtaining the best results with either type are clearly discussed.

There is also described (in Appendix II.) a simple detachable grate fitting (the Hales' Patent Fire-Back), which was evolved for increasing the draught through the fuel bed, and as it employs a polished metal surface to reflect extra radiation from the fire into the room, greatly improves the appearance of the fire.

An ingenious radiometer (described in Appendix I.) measuring the rate of radiation from the fires was used during the tests; and ease of ignition by measuring the minimum amount of heat required (as gas, &c.), as well as speed of ignition—*i.e.*, time to attain a bright fire, were all noted. The main points investigated are under the following headings:

Main Points Investigated.

(1) *Influence of Size of Coke.*—It is shown that a clean, uniform grade of coke is essential for a satisfactory fire, and the range appears to be strictly confined for gas cokes to the limits of 1 to 2 in.

(2) *Effect of Moisture.*—A definite bogy is laid by the conclusion that no evidence was found for the statement that a small percentage of moisture assists combustion, though it may be beneficial in "fixing" coke dust during conveying and handling.

Moisture is found to affect seriously the ignition and initial combustion of cokes, and to reduce the level of radiation roughly in proportion to the moisture content. With less combustible types of high-temperature coke the effect is even more marked, and large amounts of moisture lead to considerable difficulty in igniting the charge. Bluntly, excessive moisture in coke sold by weight is a flagrant form of adulteration.

(3) *Shape and Design of Grates.*—The depth of the fuel has a great influence on the combustion of cokes; increasing the depth of fuel increases the maximum rate of radiation from the fire. If the depth is increased too much it becomes necessary to use a larger size of coke in order to reduce the otherwise increased resistance in the fuel bed. Variations in the width of the grate, within moderate limits, have little influence on rate of combustion and heat emission.

(4) *Effect of Ash Content.*—Increase in ash content, though not affecting the ignition and initial combustion, reduces the rate of radiation and increases the rate at which radiation falls off—obviously due to the gradually increasing screening effect of the ash as the pieces of coke burn away. The quality of the ash is of almost equal importance to quantity; light-coloured floury ashes are to be avoided as they not only spoil the appearance of the fire, but cause greater restriction of draught in the fuel bed.

For this reason cokes prepared from slacks or finely crushed coals generally give low rates of heat emission, producing an excessive volume of finely divided ash on the surface of the fuel.

These defects of high ash content in cokes are, of course, additional to the obvious unattractiveness to the consumer of not only having to pay for an inert, useless material, but also having the extra trouble and labour of its removal and disposal, and the enhanced loss of fuel in the cinders hidden by excessive ash.

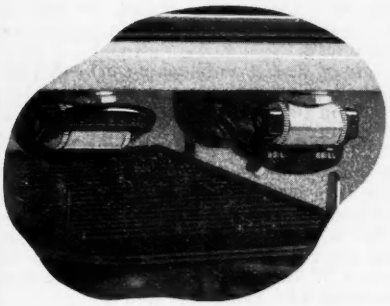
(5) *Influence of Mode of Manufacture.*—Tests on a series of cokes prepared from the same coal at temperatures ranging from 400° to 700° C. show that the temperature of carbonization has a marked effect on the combustibility. Cokes produced at 700° C. and below are easy to ignite and burn freely, while those produced at higher temperatures are more difficult to ignite and slower in combustion. This, however, does not take into consideration the now established fact that care in the choice of coals and certain processes of blending have led to the production of excellently combustible cokes even after carbonization at the highest gas-works temperatures.

(6) *Volatile Matter and Coke Structure.*—The latter statement is further borne out by the investigation which showed that volatile matter and coke structure may be of equal importance in determining the combustibility of a coke, for whereas the free burning of a coke may be reduced by a reduction in volatile matter, it may also be considerably enhanced by a suitable alteration of the structure and particularly of the porosity of the coke substance. Incidentally, an ample vindication is given here of the habit of the frugal housewife in using yesterday's cinders to start to-day's fire because "they light easier." Partially burnt coke raked from a fire, cooled and accumulated, was found to be more combustible and more readily ignitable than the original coke, although its volatile matter had been reduced from 6·5% to 1·7% during its partial combustion. This result was traced to differences in the number of open pores in the coke, the porosity of

Parkinson supremacy!

NEW MEDIUM PRICED PARKINSON COOKERS AS OUTSTANDING IN THEIR CLASS AS THE "RENOWN"

THE increasing popularity of the "RENOWN" Cooker has led the Parkinson Stove Company to make this further contribution to the success of the Industry. With the introduction of this new series of Parkinson "CROWN" Cookers, it is now possible for Gas Engineers to offer all classes of consumers the advantages of this new Parkinson fashion in all enclosed, cabinet type Gas Cookers.



UNIQUE TAP DESIGN

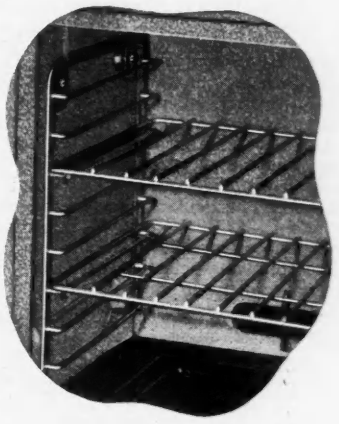
The "CROWN" Cooker taps are particularly attractive in appearance. A feature of real value to the housewife is the instant simmering position incorporated. A safety locking device in the oven tap renders accidental turning on of the gas impossible.

ENAMELLED COVER

An outstanding feature of great appeal is the white enamelled cover which closes down over the hotplate, giving it an attractive cabinet like appearance.

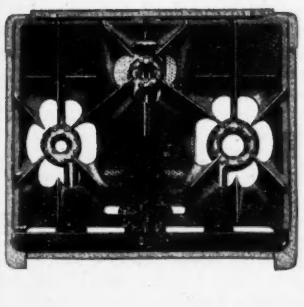
USEFUL SIDE TRIVETS

An innovation of practical utility is available in the form of detachable side trivets, for a small extra charge. These trivets, provide useful additional space for cooking utensils.



AMPLE OVEN CAPACITY

The oven capacity of the "CROWN" Cookers provides for differing requirements. For the larger household the "CROWN" B is ideal. The smooth interior and the easily removable "Clenbar" gates and grids are easy to clean.



NEW DESIGN

SEMI-SOLID HOTPLATE

The modern design of the hotplate is another of the quality features of the "CROWN" Cookers. The "CROWN" A Hotplate consists of one Boiling Burner and a combined grilling and boiling Burner. The hotplate of the "CROWN" B has two boiling Burners and one combined grilling and Boiling Burner.

The PARKINSON CROWN GAS COOKER

AVAILABLE IN TWO SIZES Crown A & B

The Parkinson Stove Company Limited - - - Birmingham 9

the partially burnt coke having been increased by breaking down and burning away parts of the walls of the formerly closed coke cells.

(7) *Influence of Type of Coal.*—Cokes prepared from different types of coal under conditions such that they contain the same volatile matter may show considerable differences in combustibility. This will be readily understood from a consideration of the variation in cell structure of cokes produced from highly coking (readily fusible) coals, as against the weaker, more open structures produced from poorly coking and non-coking coals.

(8) *Bulk density* is an important factor in the combustibility of cokes, an increase in bulk density by itself increases the difficulty of ignition and retards the rate of combustion. If the dense cokes are rendered easy to ignite by having a relatively high volatile matter, or by having been made by blending suitable coals to give an improved structure, they are to be preferred to low density cokes on account of their more lasting properties in the fire.

(9) *Comparison of Coal and Coke.*—From a comprehensive series of comparative investigations it is concluded that a combustible coke is superior to normal household coal from the point of view of freedom from smoke, ease of ignition, and rate of initial combustion.

Testing and Evaluation of Gas Cokes.

The testing and evaluation of gas cokes by the normal methods of proximate analysis are now too well known to require more than passing mention.

The significance of the results of determinations of moisture, ash, volatile organic matter, and calorific value are obvious, and the standard methods for their determination are common property and readily available in most modern fuel text books, particularly in very handy form in the publications of H.M. Fuel Research Board and of the British Standards Institution.

The following selection of British Standard Specifications may prove a useful guide in this connexion:

B.S.S. No. 420.—Sampling and Analysis of Coal for Inland Purposes.
" 404.—Sampling and Analysis of Coal for Export.
" 403.—Sampling of Small Fuel.
" 502.—Sampling of Large and Run-of-Mine Coal.
" 496.—Sampling and Analysis of Coke.
" 453.—Fusion Temperature of Coal Ash.
" 568.—Phosphorus in Coal and Coke.
" 686.—Analysis of Coal Ash and Coke Ash.
" 687.—Ultimate Analysis of Coal and Coke.
" 705.—Agglutinating Value of Coal.
" 735.—Sampling and Analysis of Coal and Coke for Industrial Tests.

These are obtainable from the British Standards Institution, 28, Victoria Street, London, S.W. 1, at about 2s. each, and should be available on every gas-works.

It is intended here to refer more particularly to several less common, though outstanding, important recent investigations of certain characteristics of coke.

Relation of Sulphur in Coke to Sulphur in the Original Coal.—The significance of the objectionable properties of excessive sulphur in coke used not only for domestic but also for industrial, and particularly metallurgical purposes does not require any considerable comment. It is well known that sulphur occurs in coal in three forms of combination—*i.e.*, as sulphates in the mineral matter (Ca SO_4, &c., probably due to infiltration) as pyritic sulphur (in combination with iron as adventitious impurity) and as organic sulphur compounds inherent in, or evolved from, the essential coal material.

On the latter form there is no method of control, but in the other two forms, considerable reduction may be effected by the conscientious pre-treatment of the coal (separation, washing, &c.), prior to carbonization.

The results of such treatment on the sulphur content of the coke will be most readily realized from a consideration of the important and valuable conclusions arrived at as the result of a comprehensive study carried out in an American State laboratory, republished in *Fuel in Science and Practice*, December, 1937 ("The Behaviour of Sulphur During Coal Carbonization," by Gilbert Thiessen).

Sulphur Contents of Coke.

The summarized conclusions are:

(*a*) The sulphur in coke is derived from both organic and pyritic sulphur in the coal: approximately 45% of the organic sulphur and 60% of the pyritic sulphur remain in the coke.

(*b*) The sulphur content of the coke is directly proportional to the total sulphur content of the coal. Approximately 50% of the total in the coal remains in the coke.

(*c*) Because of loss of volatile matter, the percentage of sulphur in the coke is about 80% of the percentage of sulphur in the coal from which the coke was made.

(*d*) Iron compounds other than pyrites in the coal (arising from infiltration or from oxidation of pyrites) increase the retention of sulphur in the coke.

The results here reported agree with the published work of other investigators and are in conformity with the generalized statements concerning the relationships between coal sulphur and coke sulphur in practical coking operations.

The Critical Air Blast (*C.A.B.*) *Test.*—In assessing the combustible potentialities of coke for domestic use, either in an open grate or in a closed stove, the C.A.B. test has proved of considerable value, and is now being extensively used to obtain a rapid measure of the reactivity of a fuel. (Blayden, Noble, and Riley, *Journal of the Institute of Fuel*, 1934.)

The original form of the test was devised by the Northern Coke Research Committee (1934), modified and adopted by the Midland Coke Research Committee (1935), and since adopted by many authoritative bodies.

It consists essentially of the determination of the minimum rate of air flow passing through a standardized bed of the fuel (10 to 20 mesh size) which is necessary to maintain combustion after a standard initial ignition of the coke by means of a heating coil above the coke bed. It has been shown that the C.A.B. (which ranges from 0·010 to 0·200 cu.ft. per minute) varies directly with the ignition period, or ease of ignition and with the time for attaining a bright fire as determined in actual grate tests.

Determination of Rate of Radiation (*Radiometer*).—A very useful and simple method of determining and comparing the rate of heat radiation from fuels in open grates is by means of the Radiometer, designed at the Fuel Research Station, described and illustrated in Technical Paper, No. 46 (Appendix I), referred to previously.

It consists essentially of a thin flat copper absorption box, properly shielded on all but the one side exposed to the radiation from the fire. A constant flow of water passes through the box (and into the outer shield casing before passing to waste) and thermometers in suitable pockets register the rise in temperature between the inlet and outlet water.

The Shatter Test is a useful standardized determination of the liability of a coke to deteriorate in transit and handling by breaking down to breeze.

The test consists essentially of dropping 50 lb. of lumps of the coke (all about 2 in.) four times from a box with a quick release hinged bottom, on to a steel plate (or level concrete floor) 6 ft. below, the coke being gathered up and replaced at each stage and then riddled through standard square mesh sieves to determine the percentage of the coke still remaining on the 2 in. sieve and the amounts passing through 1½ in., 1 in. and ½ in. holes. The results are stated variously as above 2 in./above 1½ in. Above 2 in./below ½ in., &c. (*Fuel in Science and Practice*, April, 1930). A good, firm coke should yield at least 65% above 2 in., and not more than 3% below ½ in. after this treatment.

Production of Special Cokes (*by control of carbonization, blending, activation, &c.*).—Although the first two types of coke described under this section can scarcely be regarded as "special cokes," it will be seen that owing to the very special attention paid in their production under more or less normal gas-works conditions and the very satisfactory results which ensue, they deserve special mention.

"*Dryco*" (*Liverpool*).—As a result of comprehensive investigations during 1927/1930, the Liverpool Gas Company has been making and selling, since 1930, an excellent graded coke which ignites easily, and burns freely and attractively in an ordinary well grate. It has been given the registered name of "Dryco" to distinguish it from ordinary coke, is graded ⅝ in. by 2 in., and delivered in 1 cwt. sealed bags at 2s. 2d.; its rapid commercial success is evidenced by the fact that the sales increased from 1,180 tons in 1931 to 16,800 tons in 1935, and to 18,200 tons in 1936.

This fuel is produced by carbonization at high temperatures in normal gas-works plant. In the early stages it was made from a blend of coking and non-coking slacks car-

bonized in horizontal retorts, the coke being dry-cooled in a Sulzer plant. At present it is being made in continuous vertical retorts, and its success depends upon (1) a critical selection of coals (medium coking and practically non-swelling), (2) a careful control of carbonizing conditions, temperatures, &c., and (3) a meticulous control of the testing of each batch of coke produced before being bagged for sale as "Dryco."

A standard for ignition of such coke for domestic fuel is set at a maximum of 4 cu.ft. of gas to be used to light the fire in an open grate, and the Critical Air Blast (C.A.B.) test should not be higher than 0·04 cu.ft. per minute. Incidentally, normal "Dryco" contains only approximately 2 to 3% of volatile matter, and should not be confused with low-temperature cokes which depend for their activity mainly on a content of 6 to 8%, or even more, of volatile organic matter.

"Open Fire" Coke.

Open Fire Coke (*The Gas Light and Coke Company*).—In an excellent Paper on "Coke and Its Scientific Uses," presented by Dr. Eaton at the recent May, 1938, Institution Meeting (Communication No. 182—"GAS JOURNAL," May 25, 1938), a description is given of their production and preparation of what is referred to as "open fire coke."

This is produced by the carbonization of either mixed Durham or mixed Yorkshire coals in continuous vertical retorts of narrow cross section, at high temperatures (maximum of 1,400° C.), and with 10% of steaming. The coke above 2 in. in size is cut; all the coke is graded between 1 in. and 2 in. mesh, and is further debreezed at the outlet of each hopper. Grading analyses are frequently made to control the operations of the coke preparation plant.

It is stated that continuous vertical retorts of narrow cross section were chosen for the following reasons:

(1) A free-burning, easily-ignited coke can be produced without loss of gaseous therm yield. Equal coke can be produced in horizontal retorts from similar coals, but with 3 gaseous therms less per ton of coal.
(2) The narrow cross section facilitates heat penetration to the centre of the charge and avoids overheating and the formation of graphitic carbon of poor combustibility.
(3) Steaming is of advantage since:
  (*a*) The coke is adequately quenched, avoiding the danger of ignition in hoppers and controlling the moisture content easily to below 5%.
  (*b*) The coke contains fewer fractures, and the noise of burning of water-quenched coke is eliminated.
  (*c*) The passage of steam through the charge assists heat transmission and gives a more uniform product.

The importance of this point of uniformity was also particularly stressed at these meetings by Mr. F. B. Richards, Chairman of the Woodall-Duckham Companies, in his Paper on "Carbonization from a Plant Designer's Viewpoint" (Communication No. 188, "GAS JOURNAL," May 23, 1938), who stated that "one of the most certain ways of eliminating coke complaints is constancy of quality," and introduced the further note that a constant quality of coke cannot be produced by the indiscriminate carbonization of coals of widely varying nature.

Continuing with Dr. Eaton's Paper, he states that this coke has proved so popular that sales have increased from 3,000 tons in 1932 to 35,000 tons in 1937 without any assistance from advertising.

Incidentally, it is interesting to note in this connexion that it was announced by Mr. H. C. Smith in the course of his Presidential Address at the same meeting ("GAS JOURNAL," June 1, 1935) that in the area covered by the London and Counties Coke Association alone, approximately 215,000 gas-ignited domestic coke grates have been installed during the past three to four years, some indication of the potential field for the development of the domestic coke market.

For controlling the combustibility of this open fire coke, Dr. Eaton states that the C.A.B. test is now used in place of the former stove tests, and he gives the following limits for the fuel: C.A.B. must not greatly exceed 0·06 cu.ft. per minute. Water content must not exceed 5%, grading test must approximate to 80% of 1 to 1½ in., and 20% of 1½ to 2 in.

Further interesting items from this Paper are that heating stoves or slow combustion stoves of improved design are now available which can be operated satisfactorily with coke instead of anthracite, and only need refuelling, at low rates of combustion and with boiler nut size coke, once every 12 hours, and a very good description of the design and efficiency of furnaces for grass drying, the new boon to farmers, by means of coke.

Alkali Activation of Coke.

The Activation of Coke (*by Alkalis*).—The alkali activation of coke, suggested by Professor Cobb and Mr. Hedsman, of Leeds University, about 10 years ago, and developed more recently by Imperial Chemical Industries (Winnington), is of great attraction and importance, and is now being thoroughly investigated at several centres, in high-temperature normal gas-works processes as well as in coke ovens (Institute of Fuel—November, 1936).

It has been shown that the addition of relatively small quantities of alkali (about 2% of lime and ½% of sodium carbonate) to a high-temperature coke (or preferably to the coal prior to carbonization) greatly increases the rate of combustion and enables a very pleasing and more flexible fire to be produced; the coke bed glows with a bright intensity surmounted by radiant yellow flames, giving altogether a very attractive appearance.

The importance of the process will be recognized from the fact that it has already been demonstrated that a highly satisfactory fuel for the domestic market can be produced from practically any coal in all types of carbonizing plant.

It is stated that so far the most consistent results have been obtained in continuous vertical retorts, but an indication of the potentialities of the process is given in the statement that cokes with a C.A.B. of 0·038 have been made in horizontal retorts from a strongly coking gas coal when a blank under similar conditions gave a C.A.B. of 0·058. The activated fuel was lighted in a grate under test with 4 cu.ft. of gas.

The possible deleterious effect of the added alkali (particularly the sodium carbonate) on the refractory material of the carbonizing plant will have to be determined over an extended period, and this is now being done. Swallow ("GAS JOURNAL," Nov. 11, 1936), from experiments carried out in a gas producer, concludes with the addition of lime and sodium carbonate to the coke, the attack on refractory brick lining "was not commercially serious."

Blending.—The subject of blending of coals and coals with coke breeze, &c., is too large to be discussed here at length, but a few observations are included, particularly from the point of view, which has already been referred to, of the control of the bulk density of coke and its strength, in connexion with possible special requirements.

Under the title of "Coke Strength as Affected by Coke Breeze Admixture to Coal," a Paper published in the *Proc. Amer. Gas Assn.*, 1936, pp. 771-792, describes the effect of mixing coal with varying proportions, 1-5%, of coke breeze of 5 sizes, $\frac{1}{32}$ in., $\frac{1}{16}$ in., $\frac{1}{8}$ in., $\frac{3}{16}$ in., and $\frac{1}{4}$ in., and carbonizing the resulting mixtures.

The results show conclusively that:

(*a*) The size of the resulting coke increases with an increased percentage of breeze.
(*b*) The coke strength decreases with increasing size of the breeze. (*Journal of the Society of Chemical Industry*, September, 1937, p. 861.)

Experiments at Liverpool.

In experiments carried out on the same lines by the Liverpool Gas Company, the following conclusions were arrived at:

(*a*) The rate of gas evolution is greater for a coal/coke blend than for the coal carbonized alone, and the charge is carbonized at a more uniform rate.
(*b*) The effect of the plastic layer is minimized by the presence of the "inert" coke.
(*c*) By reducing the size of the coke in the blends while keeping the coal size constant, the rate of heat penetration is increased.
(*d*) Increasing the proportion of coke in the blend gives a similar reduction in the time required to carbonize the charge.

The influence of the added coke on the resultant coke residue is summarized as follows:

(1) When the coal and coke in the blend were of the same size, ¼ in.—⅛ in., the coke produced was very weak.

(2) With coal ¼ in.—⅛ in. and coke below ⅛ in. size the resultant coke was stronger and of more even texture.

(3) A blend of coal and coke, both ground to below ⅛ in. mesh, gave a strong coke of a very uniform structure, even when the blend was as high as 40% coke to 60% coal.

We have information that extraordinarily satisfactory coke is being obtained in at least one Continental gas-works (in Holland) by blending up to 25% of finely ground coke breeze with a washed coking slack and carbonizing in intermittent vertical chambers. The coke is steam quenched in discharging chambers and results in a highly reactive dense, uniform fuel, of pleasing appearance, for which there is a great demand.

Lane and Cobb ("GAS JOURNAL," April 20, 1938, p. 165) in a Paper on "Anthracite Blends" delivered to the S. Wales Institute of Engineers, show that when blends of 50% anthracite and 50% of a highly coking bituminous coal (Black Vein Seam, Monmouthshire) are carbonized at 800° C., the properties of the blended coke are superior to those of the cokes from the individual constituents and to the average of the results from these individuals, thus:

	Apparent Density.
Carbonized blend	1·59
Raw anthracite	1·40
Carbonized anthracite	1·59
Raw coal..	1·28
Carbonized bituminous coal	1·40

The carbonized blend, although so dense, had a lower ignition point and a higher reactivity than either the anthracite or the bituminous coal when carbonized separately. Incidentally, activation by means of 0·50% of sodium carbonate multiplied the reactivity of the anthracite by six, and larger additions of alkali caused further increased activity of either the raw or carbonized anthracite.

New Markets for Coke.—In a Paper on "The Production and Marketing of Coke," presented in April, 1938, to the Midland section of the Coke Oven Managers' Association, Boon and Foxwell refer to the important work of the London and Counties' Coke Association in the investigation and development of new methods and markets for the utilization of coke. It would be useful to refer briefly here to a few of these new potentialities, probably of special local interest.

(1) *Grass Drying.*—This important agricultural development has made rapid strides since its inception only some three years ago. Last year there were over 100 plants in operation, each a potential consumer of about 200 tons of coke per annum, mostly taken during the summer months, between April and August. The producer-gas furnace specially designed for this purpose has the excellent efficiency of 86%, so that the cost of fuel per ton of dried grass has been brought down to about 19s.

(2) *Land and Marine Traction.*—Recent developments in the use of producer gas operated road traction have resulted in the production of vehicles operated at about one-third of the cost of petrol driven vehicles of equal size. Particularly on the Continent (in France and Germany) producer gas driven vehicles are becoming very numerous. Similarly, in Germany, producer gas propelled ships, both for coastal and inland traffic waterways, and up to 1,000 tons dead weight, are now operating successfully. Fuel costs with ordinary high temperature coke for 250 h.p. engines have been assessed at 0·1d. per h.p. per hour.

(3) *Fog Lifting.*—Particularly valuable for the landing of aircraft, it has been shown that by the combustion of coke round the windward side of an aerodrome the fog may usually be dispersed up to a height of 60 ft. or more above the ground to which level the craft can be safely brought by directional wireless beams in foggy weather.

(4) *Soil Warming and Orchard Heating* by hot water circulation (from coke-fired gravity feed boilers) and by coke braziers has been found to be extremely beneficial in combating heavy frosts and in increasing the yield of crops.

With the almost universal steadily increasing gas consumption it is inevitable that the amount of coke for disposal is also going to keep on increasing, and these investigations into the opening up of new coke markets are invaluable. At the same time the Industry cannot afford to neglect any clue tending towards the improvement in the quality of coke and the development of more efficient methods of utilizing it in already established markets in order to contend successfully against established and impending competition.

Electrode Boiler v. Coke Boiler.

Coke v. Electricity.—Of particular interest to this audience must be the recently published, very illuminating comparison, given by Dr. Lander and Dr. Smith, in a Paper before the Institute of Fuel of the costs of heat supply to the same group of buildings by electrode boiler and by coke boiler. The investigation, extending over several years, concerns the installations for heating and domestic requirements of a group of the South Kensington buildings of the Imperial College of Science and Technology, London. Owing to extensions of the College buildings in 1934, it was found that the electrode hot water boiler, installed in 1930, was too expensive and not adequate for the larger load. A coke boiler system was, therefore, installed, coupled to the same heating system and capable of being operated simultaneously with, or independently of, the electrical system.

As the result of a most painstaking analysis of very carefully kept acounts and heat measurement records, the Authors show that the running costs of the entire system with electricity were £2,814, and with coke £1,095 (a ratio of 2·6 to 1) under price conditions of 0·205d. per unit of electricity and 32s. 6d. per ton of coke. The thermal efficiencies of the electrode boiler and the coke boilers were 98% and 75%, respectively. It is particularly interesting to note also that even the labour costs proved to be higher for the electrode boiler (£177) than for the coke boilers (£134).

It need hardly be stressed that, particularly in an electrically-minded and developing country, the coke salesman must necessarily profit by taking advantage of any comparative investigations assisting towards a potentially rapid expansion of the coke market.

As a final note, indicating the vast importance to the Gas Industry of the efficient disposal of its coke, a brief reference may be made to the Paper entitled "The Bearing of Fluctuations in the Price of Coke and By-Products on the Cost of Production of Gas," presented by the Author at the Second World Power Conference, Berlin, 1930 ("GAS JOURNAL," July 16, 1930). Comparative data reproduced therein showed that for fluctuations in the selling price of coke represented by 16s., 22s., and 28s. per ton, the *net cost of gas production* in continuous vertical retorts would be in the region of 1·404, 0·857, and 0·310d. per therm, respectively.

The significance of these figures needs no further comment.

Discussion.

Mr. J. M'NICHOLL (Cork) congratulated the President upon having secured the services of Dr. Barash to read this Paper, as he was a recognized authority upon the subject, which was one of interest to all members of the Gas Industry. The author had gone to a great deal of trouble to compile a quantity of information from other sources, and in doing this, in addition to giving them his own views, he had rendered a great service. The Paper in booklet form would be very useful for future reference. The Paper dealt very fairly with the different types of coke, and the importance of quality and grade. The alkali activation of coke was of great importance. It reminded him of the coal liming process in use at Cheltenham about forty years ago. The liming of coal then was undertaken more with the hope of increasing the yield of ammonia; but one would not go to much trouble to do this to-day. In fact, if they could decrease it in any way, they would be only too pleased to do so. He did not remember hearing at that time that the coal liming had any great effect upon the quality of the coke. The fact that it might have an effect upon the refractory material indicated that they must proceed very carefully in this direction. Coke was a very important consideration in the choice of a carbonizing plant. If one

wished to produce a coke for the domestic market, it had to be of a light and porous character, and highly reactive. For the industrial market a larger, denser, and less reactive coke would be required, as pointed out by the author. He did not think there was any plant that could produce every kind of coke, and it was only on very large works that there could be plant to produce both kinds. This, of course, would be ideal. It was, of course, possible, by variation of the type of coal and by blending, to produce more than one type in the same plant, if circumstances justified this, but there was a great deal of work involved, and the advantage must be proportionate in order to justify such a course. There must be the certainty of increased revenue, to off-set the additional expenditure. Personally he considered that, for small and medium sized works, the old-fashioned horizontal retort produced about the best all-round coke. One got large coke for industrial purposes and small coke which was very suitable for the domestic market. Continuous vertical coke, he could quite believe, was ideal for the domestic fire, but it was not so well able to meet the demand when a hard, dense coke was required.

Coke Handling.

Continuing, Mr. M'Nicholl said the author mentioned control of moisture content, which was very important. It was not every works that could install complicated plants, but even when such plants were not available it was possible, with a little care and ingenuity, to achieve practically the same purpose. In Cork they handled their coke by De Brouwer conveyors, which removed it to rotary screens over the storage hoppers. At first it was found that, if they applied sufficient water to quench the large coke, the small coke became very wet indeed. This difficulty was overcome by only partially quenching the coke on the conveyors. Just sufficient water to quench the small coke was applied; the final cooling of the large coke being effected by a spray of water in the last 6 ft. or so of the rotary screen. In this way, both the large and the small coke were satisfactory. The bulk of the demand was for large coke. They did not break coke, and those with experience of coke handling would probably infer that the conveyors and screen saved them the trouble. But they used only the best quality Durham coal and full charges, and got quite a big proportion of good large coke, and not many smalls. He might say that they did not rely upon the rotary screen alone for screening. They had a stationary screen, and now a power-driven vibrating screen had been installed, which was a distinct success, and would probably be extended in the near future. The medium grade of coke as regards moisture and ash was of good quality, and there was a growing demand for it, chiefly for domestic use. The bulk of their demand was, however, for the large grade, which was of excellent quality in every way. There was a good demand for bakeries and central heating, and this was business which they were anxious to retain—at any rate, until they could convert the installations to burn gas.

He had experimented with a number of coke-burning domestic grates, and had found them good, but the best of them certainly required a little more attention than the ordinary coal fire. One of the greatest drawbacks was the need for getting rid of the ash: There were ways of doing it, but he had not yet found a fool-proof method. If they could find some simpler means of keeping a coke fire clear of ash, he thought they would go ahead much more rapidly. He found with the majority of the fires that the best way was occasionally to prick the fire down with a poker. He proposed a hearty vote of thanks to the author.

The Question of Sulphur.

Mr. F. J. EDMONDS (Waterford), seconding the vote, remarked that the Paper had been so well conceived that it could not be open to much criticism. If they wished to get the best coke, it was necessary in the first instance to give close attention to the class of coal used. It was pointed out in the Paper that approximately 50% of the total sulphur in the coal remained in the coke, and that because of loss of V.M. the percentage of sulphur in the coke was about 80% of the percentage of sulphur in the coal from which the coke was made. Could the author tell them how they could deal with coals possessing a high sulphur content? Nowadays they had to put up with coal which they would not care to accept under more normal conditions. If the sulphur was very high, was there any means of eliminating it? How was the blending to be done if done at all? Could some lime be added to the coke to have the same effect? If alkali was required in improving the quality of the coke, had any consideration been given to treating the coals with ammoniacal liquor? There they had an alkali which they would be only too pleased to get rid of to the benefit of the coke production. As to the calorific value of coke from horizontal and vertical retorts, where customers in his area had had the choice, they had preferred to pay a higher price for horizontal coke. Whether it was that in the horizontal retort they did not purge the coal quite so much, or what other reason there might be, he was not altogether sure. He had been successful in obtaining orders for graded coke where anthracite coal had been previously used.

Another point to which he would like to refer was the return of fine breeze to the coal prior to carbonization. On trying this some time ago, he found it very detrimental to the coke afterwards.

Mr. L. G. YOUNG (Carlow), referring to the mixing of chemicals with the coal, said he remembered that years ago there used to be a material advertised for putting in the coal for this purpose. He never tried it, but he thought there was a general opinion that it was not of much use.

Be Realists.

Mr. P. J. MACEVOY (Midleton) remarked that they should be realists. The problem to-day, so far as Ireland was concerned (and it would be in the future), was to dispose of the coke. It seemed to him that they were approaching the stage where they were going to have much more severe competition. He thought that the future of their Industry rested with total gasification. He was very interested in bakers' ovens and central heating, and at the moment there was a very serious competitor—that was, automatic coaling, which was being employed very successfully to-day. They would have a glut of coke later on in that country, until they could use it more extensively for bakers' ovens, central heating, &c.

The Author's Reply.

Dr. BARASH, in reply, thanked the members for the interesting and useful discussion. He agreed with Mr. M'Nicholl that the production of different qualities of coke to satisfy varying demands was only feasible on large works, and that the continuous vertical retort, which was essentially an ideal gas-making unit and incidentally produced an attractive, freely burning, domestic coke, was naturally not suitable for meeting a demand for a particularly hard, dense coke. For such a purpose, the intermittent vertical system referred to in the Paper had been more or less specially developed. As to the cost of installing blending plant, he referred to the fact that such an installation need not be particularly expensive, but that, in any case, experience has shown that, particularly when taking into account the utilization of comparatively cheap fuels—washed slacks and coke breeze or dust—resulting in the production of excellent cokes the process of blending has proved to be remunerative.

With regard to the question of how to deal with a coal of high sulphur content, Dr. Barash stated that, although in the process of steaming during carbonization a reduction in the sulphur content of the coke was effected, it was certainly highly preferable to reduce the sulphur in the coal prior to carbonization, as indicated in the Paper, by separation, washing, cleaning, &c.

In the work referred to on the activation of coke by the addition of alkalies, the lime, &c., was admixed with the coal by hand. Addition of alkalies to coke had also been attempted in several cases, but had apparently been abandoned; the main reason being most probably that this could not be as effective as the introduction of the alkali throughout the coke mass (as during the plastic stage of carbonization). The activity of this prepared coke could be explained by assuming that the alkali tended to fuse and remove in the manner of bursting soap bubbles the successive layers of ash formed during the combustion of each piece of coke. If this explanation were near the truth, then obviously the suggested addition of ammonia liquor could not be effective as an activation agent.

In comparing cokes from vertical and horizontal retorts, it would be realized that cokes from similar coals could only vary in calorific value according to the content of volatile organic matter (which had a higher C.V. than pure carbon); and if one coke was better than another in this respect, it could only be at the expense of considerably more valuable gaseous therms which should have been evolved during carbonization.

The return of the fine breeze produced during carbonization or during cutting and screening (and there was very little to distinguish between the two in the author's opinion), to the coal prior to carbonization had been carried out successfully, and with benefit in several cases, but only where the conditions of mixing approached blending. With inefficient mixing, the results were definitely poor, and the use of breeze was harmful rather than helpful.

The subject of total gasification was obviously one which merited a complete session of its own.

With regard to the use of coke in place of coal in automatic stokers, there appeared to be no reason why this should not be successfully developed—this to be only another stage in the growth of such replacements which have apparently already taken place in many instances, in "anthracite" stoves and several well-known makes of domestic grates, as was instanced by several speakers in the discussions of Papers at the June, 1938, Institution meeting in London.

Gas Undertakings' Results

Aberfeldy.

At the Annual Meeting of Aberfeldy Gaslight Company, Ltd., it was reported that gas production had reached the record figure of 9 million cu.ft. for the year.

Colne.

A slight falling off in the quantity of gas sold was experienced by the Borough of Colne Gas Department during the twelve months to the end of March last, the actual amount having been 216,960,700 cu.ft., as compared with sales of 223,283,000 cu.ft. in the twelve months to March, 1937. Of the gas consumed in the past year 28·49% was taken through ordinary meters and 43·48% through prepayment meters, while 8·6% was for industrial purposes. The average annual consumption works out at 28,035 cu.ft. by ordinary meter and 17 071 cu.ft. by prepayment meter—making an average for both classes of consumer of 22,553 cu.ft. The number of gas-lit public lamps in Colne is now 1,272. The re-lighting of various main traffic routes in the borough has been approved, and part of the scheme will be in operation during the coming winter. Of the net profit of £5,041, £3,162 has been transferred to revenue outlay and £1,879 carried forward.

Cupar.

At the Annual Meeting of Cupar Gas Company the Chairman said they had strong competition from electricity, but in spite of this they had sold 56,112,000 cu.ft. of gas last year—an increase of 758,000 cu.ft. over the previous twelve months. It was agreed to pay a dividend of 5%, less tax, on the preference shares and of 10%, tax free, on the ordinary shares.

Fraserburgh.

At a meeting of the Fraserburgh Gas Committee, Mr. A. W. Farquhar (Engineer and Manager) reported an increase of 790,000 cu.ft. for the past financial year, despite the intensive competition of electricity, while the past two months have shown an increase of nearly 6% over the corresponding period last year. Despite an increase in coal prices it is hoped to continue the price of gas at the present rate.

Glasgow.

At a meeting of Glasgow Corporation Gas Committee on Aug. 5, Councillor Thomas Wilson (Convener) reported that there was a deficit on the year's working of £52,324—larger than was anticipated, the increase being due to irregular coal deliveries and the frequent replacing of good quality coking coals by poorer qualities. Earlier this year Mr. J. W. McLusky (Gas Engineer and Manager) estimated the loss arising from these sources at £54,000 The Convener pointed out that the Department's coal bill had risen in four years by nearly £170,000—equivalent to an annual increase of 4·345d. per 1,000 cu.ft. The year showed an increase of 40 million cu.ft. on the record sales figure of the previous year, while revenue from cooking and water heating appliances was practically doubled. During the past four years the price of gas had been reduced by 8d. per 1,000 cu.ft.—equal to a return to the consumer of £296,000 per annum. Despite increased costs and the reduction in the price of gas, the financial position of the Undertaking was sound, a surplus of £87,213 being carried forward to next year's accounts. The Committee recommended that the price of gas should remain as at present.

Hinckley.

The accounts of the Hinckley Gas Department indicate a gross profit of £12,085 and a net profit of £306. Mr. James Bennett (Chairman of the Gas Committee) stated at a recent meeting of the Council that the past year had had more difficulties than usual due to the completion of the works reconstruction, in the form of the new retort house, and to the ever increasing prices of materials and labour, especially coal. This continued increase in the price of the major commodity was causing the Gas Committee great concern, especially as in the present year they would be starting on contracts which carried the full increase, whereas previously they had had the advantage of contracts made before the full increase applied. At any rate, he was glad to say that they were able to congratulate themselves on the fact that they now had a works second to none in the country, and which would remain so for some considerable time to come, and give economical results from which they would benefit considerably in the future. Unfortunately, the increases in the prices of all the commodities had made it necessary for the Gas Committee reluctantly to recommend the increase in the price of gas by ½d. per therm. He added that it had been the sole endeavour of the Committee and management over the past two years or so to avoid having to pass these increased costs on to the consumers, but the policy of this undertaking being to supply gas at the lowest possible price, there was not sufficient margin left to bear this additional expense. The net profit on the year of £306 was, he regretted to say, the lowest since 1900, and he suggested that this was proof of the necessity of the action of the Gas Committee in recommending the increase in the price of gas. Mr. B. Coley seconded the adoption of the report and said the price of commodities had been steadily rising for the past 18 months and the Gas Manager was to be congratulated upon not asking for an increase until the end of the present half-year. The report and statement of accounts was approved and the increase in gas prices agreed to.

Kirkcaldy.

The net capital debt outstanding on the gas undertaking of the Royal Burgh of Kirkcaldy at May 15—£133,016—was just about one-half of the total amount borrowed. In other words, the net debt was £454 per million cu.ft. of gas made, compared with a corresponding figure of £1,248 in 1922. The financial year which ended on May 15 last was a satisfactory one for the Department, with an increase of 10% in the output of gas, which amounted to a total of 293,124,000 cu.ft., as against 266,329,000 cu.ft. in the previous year. In the aggregate the consumers increased in number, though ordinary meters show a slight falling off. At May 15 there were 4,312 ordinary meters, with an average consumption of 20,835 cu.ft., and 9,023 prepayment meters, with an average consumption of 14,510 cu.ft. Despite early delay due to the shortage of steel, a new 600,000 cu.ft. " M.A.N. " waterless holder is now well under way, and it is hoped to have it in operation by late autumn. The popularity of the Department's extended hire-purchase schemes is proved by the greatly increased number of hire-purchase sales of appliances. Reductions have been made in charges, which are on the block system.

Loughborough.

During the year to March last the Borough of Loughbroough Gas Department incurred capital expenditure amounting to £44,716, the major portion of which was in connexion with the purchase of the undertaking of the Quorndon Gas Company. The Quorn works were closed as a manufacturing station at the end of January, and since that time the whole of the gas required has been produced at Loughborough. The total sales of gas amounted to 157,623,000 cu.ft., representing an increase of 12·37% on those of the previous year, the increase for Loughborough only being equal to 5·37%. Of the output, 23·65% was taken by ordinary domestic consumers, 39·8% by prepayment consumers, and 18·67% for industrial and commercial purposes.

Nelson.

The accounts of the Borough of Nelson Gas Department for the financial year to March show a gross profit of £26,101, as compared with £24,150 for the previous year, the net profit being £6,580, as against £4,659. Of this net profit £5,227 is transferred to the General Rate Fund Revenue Account. The quantity of gas sold during the year was 398,173,900 cu.ft., which compares with a total of 405,340,100 cu.ft. during the year to March, 1937. The quantity of gas used in street and shop lamps shows some increase. There are now 1,709 street gas lamps in Nelson.

Northampton.

The accounts of the Northampton Gas Light Company for the year ended June 30 are of a satisfactory character, though it is pointed out that this does not apply to the coal situation—" as much as 30% increase being demanded for forward contracts." The dividend is at the maximum rate of 5% per annum, which leaves a balance of £44,467 to be carried forward to the next accounts. During the year considerable improvements have been carried out in the public lighting of the town, and new long-period contracts have been made with a number of village councils. There was a slight increase in the sales of gas over the year. An issue of £48,984 of consolidated stock in May was subscribed two-and-a-half times over. On Jan. 1 the price of gas was increased ½d. per therm.

Oldham.

At Oldham, a net profit on the Corporation Gas-Works for the year ended March 31 of £16,507 has been reduced by £4,000 by the contribution of this amount to the Borough Fund. Promotional tariffs are in operation, and for certain specified purposes (including central heating and steam raising) the charge is as low as 1s. 4d. net per 1,000 cu.ft. There is also a two-part tariff, with a commodity charge of £2 per annum per house (paid quarterly) and gas at 2s. 3d. per 1,000 cu.ft., less 6d. per 1,000 cu.ft. discount. The actual number of consumers on March 31 was 61,447; the number of prepayment meters in use having increased during the year from 43,649 to 45,029. At 39,132, the number

of cooking stoves and grillers in use showed an increase for the twelve months of 787. These figures do not take into account cooking stoves owned by consumers. At March 31 there were 22,242 gas fires in use, excluding those owned by consumers. The number of switch lights sold within the supply area has now reached 20,633. The figures of gas sales shows that there has been an increase in the quantity consumed in houses and shops of 1,842,700 cu.ft., and an increase for mills and workshops of 15,056,000 cu.ft. There has been an increase during the year of 72 in the number of public street lamps of the incandescent type—to 4,188 within the borough and 2,410 in the out-townships.

Oswaldtwistle.

The report for the year to March of the Oswaldtwistle Urban District Council Gas Department states that the total quantity of gas sent out amounted to 193,507,000 cu.ft., which shows a decrease of 3·22% on the previous year. Of the gas consumed 22·75% was by ordinary meter and 42·75% by prepayment meter. Industrial consumers took 23%. The decrease in domestic and trade consumption has been largely due to the state of trade in the township, coupled with the unseasonable weather. Unaccounted-for gas has been reduced from 3·28% to 1·98%. Cookery lectures were held in the showrooms during two separate weeks, with record attendances, the business done being very satisfactory. Gas equipment installed in some Council houses now in course of erection includes a panel fire in all main bedrooms, wash boiler, and gas poker in living rooms. Almost the whole of the public lighting is by gas. A scheme for re-lighting the Blackburn Road by high-power suspension lanterns, when completed, will comprise approximately 42 lamps, and will be in accordance with the recommendations embodied in the final report of the Ministry of Transport for the lighting of Group A roads.

Perth.

Speaking of the rising cost of electricity in Perth as against a reduction in the price of gas, Treasurer Fleming, at a Town Council meeting on Aug. 8, said that in the case of electricity they were at the mercy of others so far as cost was concerned, whereas in the case of gas they had the control in their own hands. Net revenue balance in the Gas Department was reported by Convener Gowans at £16,588. Sales had increased by 5·91% during the last year, compared with an estimated rise of 2%. Revenue had been £1,593 more than anticipated. Against this the increased quantity of coal required plus a 5% increase in carriage costs, had meant the expenditure of an additional £1,073. Sales of appliances were up by 44% over the previous year. The charges of 3s. 3d. per 1,000 cu.ft. for ordinary users and 3s. 5d. for prepayment meter consumers is to remain unchanged for the first 15,000 cu.ft. Thereafter both classes of users will pay 2s. 8d. per 1,000 cu.ft.

Ramsbottom.

Mr. William Fenwick, who presided at the half-yearly meeting of the Ramsbottom Gas Company, reported that sales of gas showed a satisfactory increase of 2,900,000 cu.ft. The sales of new appliances during the half year totalled 469. He again expressed concern regarding coal prices. One interesting item on which he reported was the new method of charge for gas to domestic consumers, which by the payment of a quarterly service charge of 9s. 9d., enables consumers to obtain all gas required at the figure of 4½d. per therm net.

Salford.

From a gross profit on the operations of the City of Salford Gas Department for the financial year ended March 31, charges have to be met totalling £84,322, leaving a net profit of £18,121. The charges include the customary contribution of £12,090 in aid of the rates. After the decline of the last few years, the quantity of gas sold shows a gratifying increase of 2·85%, as compared with the sales of the previous year. Some of this increase is due to the improved gas street lighting, but the greater part resulted from an increased output for industrial purposes. There is continued evidence that the more attractive rate offered to industrial consumers under the multi-part tariff is being appreciated, and will be effective in further improving the sales of gas. The Committee record the heating by gas of a new Senior School in the Salford area of supply; while the large bakery of the Eccles Co-Operative Society is now operating very successfully entirely on gas, both for heating and lighting. Again, some 166 fish friers in the area of supply have now gone over to gas for their cooking, and with such success that others are changing over at a rate which means that in a short time comparatively few will be employing solid fuel. The lighting of some 3,500 lamps in the residential streets of the city has been improved, and the lamps converted to clock control. The Committee remark that the carbonizing and coke handling plant at the Liverpool Street Works has passed the end of its economic life, and that it will be necessary at an early date to submit a scheme for its modernization. The continued advance in the price of coal, the higher cost of wages and materials, and the heavy amount of accumulated deficiency existing, led to a suggestion to increase the price of gas, which was adopted by the City Council on June 1. At the same time a domestic two-part tariff was adopted, and it is confidently anticipated that the financial benefits accruing to the gas consumer from this tariff will be appreciated and result in an increased use of gas for domestic purposes. The consumers are almost equally divided—41,714 ordinary, and 40,963 prepayment. The numbers of cookers on hire at March 31 were 26,086 ordinary and 9,760 prepayment.

St. Helens.

The accounts of the County Borough of St. Helens Gas Department for the financial period to March last show a net profit of £13,590, of which £5,871 has been transferred to the General Rate Fund Account. There has been an increase in gas sold of 4·47% as compared with the previous year, the total sales having reached 1,076,373 278 cu.ft.—470,819,295 cu.ft. by ordinary meter and 520,725,719 cu.ft. by prepayment meter. The number of consumers at March 31 was 30,176, an increase of 916 during the year. Of these, no fewer than 27,213 are supplied through prepayment meters. Exhibitions and cookery demonstrations held in the various districts of the gas area during the year proved very successful. Sales of appliances on hire-purchase terms totalled £21,339, as against £6,628 in the previous year. This large increase has been due in a measure to the new policy of the Committee in extending the terms of the hiring of appliances for payment over a period of seven years, and in introducing a Sales Bonus Scheme. The figures relating to manufacture reveal an increased production of benzole and naphtha, with an increase in gaseous therms per ton of coal from 74·15 to 75·18. It has been intimated that the Board of Trade have completed the St. Helens Gas Order, 1938, providing for the transfer of the Rainford Gas Undertaking to the Corporation. An application has been made by the Corporation to the Ministry of Health for permission to borrow £15,000 for the improvement of the gas street lighting.

Sedgley.

The accounts of the Sedgley Urban District Council Gas Undertaking shows a profit on the year of £5,344, the net profit being £1,418, compared with £2,303 the previous year. It was pointed out that, with the price of their gas at 3s. 3d. per 1,000 cu.ft., which was very low, it was a matter for congratulation that they had made a profit of £1,418.

Shrewsbury.

The Directors of the Shrewsbury Gas Light Company, in their report for the year ended June 30, state that there has been an increase of 4,000,000 cu.ft. in the volume of gas sold, as compared with the previous year. The actual amount sold by meter during the year to June last was 292,702,400 cu.ft., or 1,346,431 therms. Additional purifying plant has been erected and put to work, as well as a larger gas compressor for meeting increased demands on the high-pressure mains. The gross profit on Revenue Account, at £9,868, compares with £9,405 a year ago. The dividend for the year is 6¼%.

Skipton.

There was a slight increase in the quantity of gas sold by the Skipton Urban District Council in the twelve months ended March 31. Of the 114,845,600 cu.ft. sold, 33% was taken through ordinary meters, and 44% through prepayment meters. Baking and fish frying (at commercial rates) took nearly 2%, and central heating 4½% of the total. The average consumption or ordinary consumers was 32,765 cu.ft., and of prepayment consumers 16,509 cu.ft. In the early part of this year a large baker's oven was converted to gas firing, with a consumption of 40,000 cu.ft. per week. A further setting of six retorts on the Congdon system was built last autumn. There are now three such settings. A steam pre-heater has been inserted at the inlet to the purifiers, to raise the gas temperature during cold periods.

Stirling.

The Stirling Gas Light Company reports that profits for the past year rose by £1,005 to £13,225. A final dividend is to be paid on the original capital of 10s. 9d. per share, less tax, and 12s. 6d. per share, less tax, on the new ordinary capital.

Stockton.

The Stockton-on-Tees Corporation Gas-Works' accounts for the year ended March 31 last show an income of £179,077, working expenses £130,363, gross profit £48,714, loan charges £28,879, contributions to reserve £3,146, balance carried forward £3,441. The gross profit is equal to 7·48 per cent. on the capital cost. Gas sold during the year amounted to 665 million cu.ft., against 646 million in the preceding year. Gross profit in 1936-37 was £43,907. There is a net debt of £185,190 on the gas-works.

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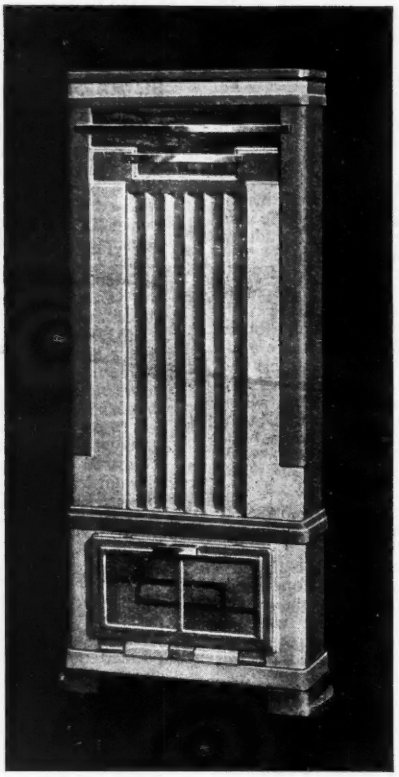


COMPACT, SMART AND ECONOMICAL

The VELOMAIN Heater is the best thing in Space Heating yet designed. In the first place, it needs no flue, the gas consumption being inside the limits for flueless heaters. Secondly, it is a most satisfactory heater, as it warms up quickly and circulates the air of a room 12×10×10 ft. over 2½ times each hour. As is fitting, its design is modern, and it is made in a variety of colour finishes, blending harmoniously with any scheme of decoration. Furthermore, thought has been given to upkeep. The design is simple and accessible for the little cleaning required, while the body is made from sheet steel, for long service, with cast-iron partswhere rigidity and strength are required.

TWO GREAT IMPROVEMENTS

Two very important developments have been achieved in the VELOMAIN Space Heater. The design ensures that the top and back do not become unpleasantly hot, while the heat is projected into the room at such an angle as to prevent discoloration of the walls or ceiling immediately behind or above the heater, thus obviating one of the greatest drawbacks found in the ordinary radiator of the past.

NOTE THESE UNIQUE PRINCIPLES

1. The large volume of pure air mixed with the heat stream issues horizontally from the Heater and so quickly warms the apartment.
2. The front body of the Heater is evenly warmed throughout its length.
3. The top and exterior back are kept cool by the constant stream of fresh air passing up the double back. Wall decorations are thus saved from damage by discoloration or deposit.
4. The amount of pure air drawn through the Heater ensures perfect combustion; prevents overheating and abolishes the necessity for any thermostatic device.

MAIN
VELOMAIN
SPACE HEATER

Visit our Stand at the EMPIRE EXHIBITION GLASGOW—123/127 Palace of Engineering

R. & A. MAIN LIMITED, LONDON AND FALKIRK

London Office and Showrooms: 48, Grosvenor Gardens, S.W.1. Glasgow Office and Showrooms: 82, Gordon Street

Markets and Manufactures

Current Sales of Gas Products

The London Market

LONDON, *Aug.* 22.

There are no changes to record in the values of Tar Products in the London market, which remain as under:

Pitch nominal at about 33s. per ton f.o.b.
Creosote, about 4¼d.
Refined tar, 3¾d.
Pure toluole, 2s. 1d. to 2s. 2d.
Pure benzole about 1s. 9d.
95/160 solvent naphtha, 1s. 7d.
90/160 pyridine about 10s.
All per gallon naked at makers' works.

The Provinces

Aug. 22

Crude Gas-Works Tar, 15s. to 20s.

To avoid misunderstanding, it is necessary to state that the above price is not claimed to represent a market value. It is a price worked out from week to week upon a system which has been used for many years as a basis for the fixing of certain contracts for crude tar of varying qualities in different areas.

The average prices of gas-works products during the week were: Pitch—East Coast, 31s. to 32s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 31s. to 32s.* Toluole, naked, North, 1s. 7½d. to 1s. 9d. Coal tar, crude naphtha, in bulk, North, 7¾d. to 8¼d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 5d. Heavy naphtha, North, 1s. 3d. to 1s. 3½d. Creosote, *ex* works, in bulk, North, liquid and salty, 4¾d. to 4⅞d.; low gravity, 4¼d. to 4½d. Carbolic acid, 60's, 1s. 9d. to 2s. Naphthalene, £13 10s. to £16. Salts, 70s. to 75s., bags included. Anthracene, "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal; "B" quality unsalable. Heavy oil: Unfiltered heavy tar oil, min. gr. 1,080, 4¾d. to 4⅞d.; filtered heavy tar oil, min. gr. 1,080, 5¼d. to 5½d.; heavy tar oil, gr. less than 1.080, 4¼d. to 4¾d.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Scotland

GLASGOW, *Aug.* 20.

Enquiries are numerous but new business continues scarce.

Crude gas-works tar.—Actual value is about 37s. to 38s. per ton *ex* works in bulk.

Pitch remains weak at round 25s. per ton f.o.b. for export and 23s. per ton *ex* works in bulk for home trade.

Refined tar.—There is a moderate demand in the home market at fixed price of 3¾d. to 4d. per gallon, but export continues very quiet with quotations unchanged at 3d. to 3¼d. per gallon in buyers' packages at makers' works.

Creosote oil.—Prices are reasonably steady as follows: Specification oil, 4¾d. to 5d. per gallon: low gravity, 5¼d. to 5¾d. per gallon: neutral oil, 5d. to 5¼d. per gallon; all *ex* works in bulk.

Cresylic acid.—There is still very little business being offered and quotations are easy as under: Pale, 97/99%, 1s. 6d. to 1s. 8d. per gallon; dark, 97/99%, 1s. 4d. to 1s. 6d. per gallon; and pale, 99/100%, 1s. 9d. to 2s. per gallon; all according to quality, *ex* works in buyers' packages.

Crude naphtha is valued at 5½d. to 6d. per gallon *ex* works in bulk, according to quality.

Solvent naphtha.—90/160 grade is 1s. 4d. to 1s. 4½d. per gallon and 90/190 heavy naphtha is 1s. 1d. to 1s. 1½d. per gallon.

Motor benzole is steady at 1s. 4d. to 1s. 4½d. per gallon.

Pyridine.—90/160 grade is 8s. 6d. to 9s. per gallon and 90/140 grade is 9s. 6d. to 10s. per gallon.

Benzole Prices

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole..	0	9½	to	0	10	per gall. at works
Motor „ ..	1	3	„	1	3½	„ „ „
90% „ ..	1	4	„	1	4½	„ „ „
Pure „ ..	1	8	„	1	8½	„ „ „

Contracts Advertised To-Day

Coal.
Shipley Gas Department. [p. 486.]

Gasholder.
Coalville Gas Department. [p. 486.]

Dividend Announcement

United Kingdom Gas Corporation, Ltd.—The Directors of the United Kingdom Gas Corporation have declared an interim dividend of 2%, less tax, payable on Sept. 13, 1938, on the Ordinary shares of the Corporation.

Airdrie Gas Department

Mr. Archibald Kellock, Engineer and Manager of the Airdrie Gas Department, in his annual report to the Town Council, stated that during the past year gas made was 135,525,000 cu.ft., as against 142,465,000 cu.ft., a decrease of 6,940,000 cu.ft., or 4·87%. The coal carbonized amounted to 7,885 tons as compared with 7,887 tons. The yield of gas per ton of coal carbonized was 17,188 cu.ft., as compared with 18,063 cu.ft., the decrease being due to indifferent quality of coal delivered during the "peak" period of the winter. The total quantity of gas sold was 126,367,400 cu.ft., compared with 133,335,600 cu.ft., a decrease of 6,968,200 cu.ft., or 5·22%. Public lamps consumed 17,050,800 cu.ft., as against 14,590,200 cu.ft., an increase of 2,460,600 cu.ft. The total income of the undertaking amounted to £33,507, as against £33,974 for the previous year, a decrease of £467. The gross income from residuals amounted to £4,042, as against £3,683 for the preceding year, and after deducting the cost of handling, the net income from this source amounted to £3,654, as against £3,320 last year, an increase of £334. The total expenditure under revenue account was £27,596, as compared with £27,169 for the previous year, an increase of £427. There is a surplus balance of £5,911 to be carried to the credit of the net revenue account to meet the annual charges. There were no capital borrowings during the year but loan debt to the amount of £4,414 was repaid. The oustanding loan debt now amounts to £19,949.

PROTECT WITH

METROTECT

a bituminous paint producing a pleasant satin black finish with highly waterproof and anti-corrosive properties.

Protects steel-work which is continuously or periodically immersed in water. Does not become brittle on prolonged atmospheric exposure. METROTECT flows freely under the brush and can be applied quickly and without effort even in cold weather.

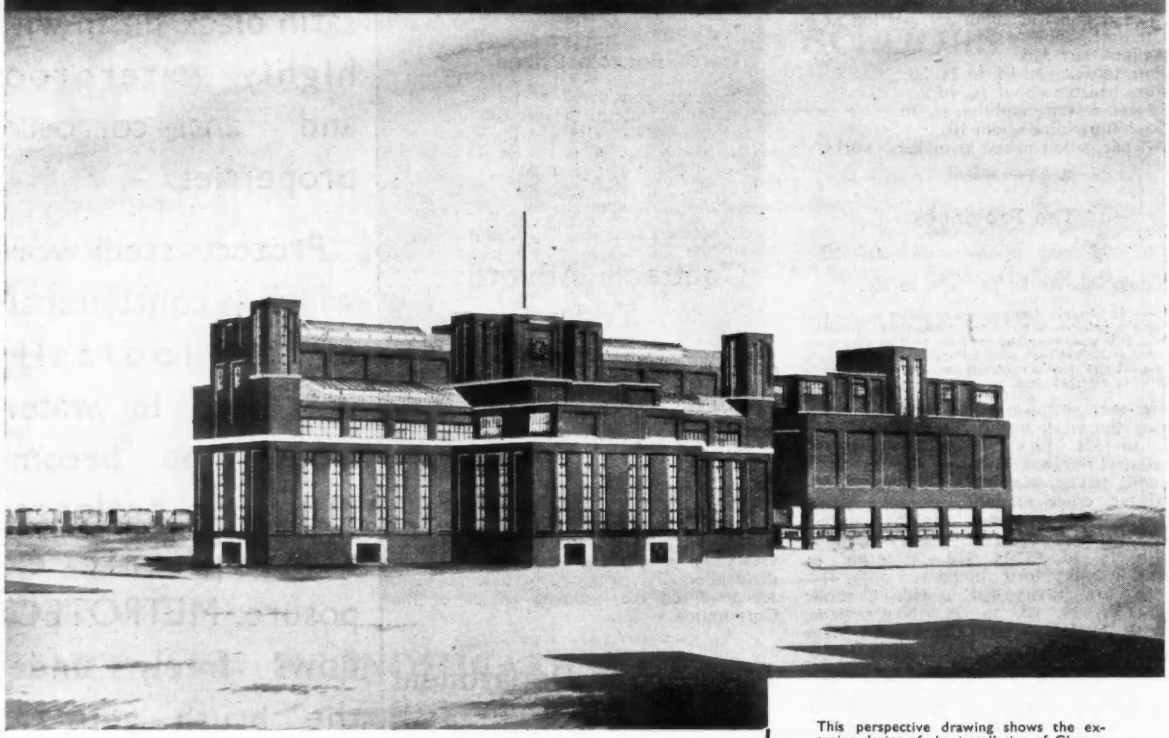
Prices and further particulars from—

SOUTH METROPOLITAN GAS CO.

PRODUCTS DEPARTMENT,
REGIS HOUSE,
KING WILLIAM STREET,
E.C.4.

NEW

Glover-West PLANT FOR BLACKPOOL



This perspective drawing shows the exterior design of the installation of Glover-West continuous vertical retorts ordered by the BLACKPOOL Gas Department for the new Corporation Gas Works to be established at Marton, as it will appear when completed. Interesting and important new features will make this 72-retort plant, with its extensive coal and coke-handling and waste-heat recovery equipment, an outstanding example of modern advances in carbonizing practice.

A carbonizing plant which will be one of the most complete and economical in operation so far erected in this country.

Dignity allied with utility in architectural treatment will be a striking external feature of Blackpool's new Glover-West installation. It will also embody the many advantages and amenities upon which the world-wide prestige of the Glover-West system has been built during 30 years of constant research and development for the advancement of gas production methods.

WEST'S GAS IMPROVEMENT COMPANY, LTD.

MANCHESTER: ALBION IRONWORKS, MILES PLATTING 'Phone: COLLYHURST 2961 : 'Grams: "STOKER, MANCHESTER"

LONDON: COLUMBIA HOUSE, ALDWYCH, W.C.2 'Phone: HOLBORN 4108 : 'Grams: "WESGASCO, ESTRAND, LONDON"

GAS STOCKS AND SHARES

Apprehension regarding political events abroad coupled with further weakness in Wall Street caused another dull week on the Stock Exchange. Business was on a very small scale, and in the absence of support prices in most sections were marked down. British Government stocks and foreign bonds remained fairly firm, but the latest disappointing traffic returns led to further reactions in the home rail market. The industrial section was patchy, textiles being particularly weak, though small rises were noticeable among a few of the leading favourites. There were no special features in the oil, rubber, or mining markets which continued neglected, and price movements though small were mostly downwards.

Conditions were also quiet in the Gas market, business being confined for the most part to the stocks of the larger undertakings. Prices, with few exceptions, remained unchanged, though it will be seen in the Official List below that three stocks were marked down. At the Provincial Exchanges, Newcastle units closed fractionally higher, and Weston-super-Mare 4% debenture was marked up 2½ points. Nominal quotations in the Supplementary List remained unaltered.

How seldom it is that gas securities as investing media receive Press attention, and yet the adequate security offered under existing conditions should satisfy the most exacting investors. Doubtless the absence of any speculative opportunity in the case of the majority of issues gives them poor "news" value—in other words, they are too safe and sure to be interesting. If the possibilities of the market were more widely known, however, some adjustment of existing prices would follow. A survey of the yields now obtainable especially among "ordinaries," which range from 5 to 8%, also indicates that some appreciation in value is justified.

Official Quotations on the London Stock Exchange

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Aug. 19.	Rise or Fall on Week.
1,767,439	Mar. 7	8	8	Alliance & Dublin Ord. ...	145—155	...
374,000	June 20	4	4	Do. 4 p.c. Deb. ...	93—108	...
734,733	May 9	5	5	Asscd. Gas & Water U'd'ts Ord.	17/6—19/6	...
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/—21/-	...
444,389	,,	§–/4	4	Do. 4 p.c. Red. Cum. Pref.	19/—20/-	...
296,523	,,	4	4	Do. 4 p.c. Irred. Cum. Pref.	16/—18/-	...
500,000	Mar. 7	3½	3½	Do. 3½ p.c. Red. Deb. ...	94—99	...
558,890	Feb. 21	7	7	Barnet Ord. 7 p.c.	158—163	...
300,000	Apl. 4	1/4½	1/9⅜	Bombay, Ltd.	24/6—26/6	...
179,915	Feb. 21	9½	9½	Bournemouth sliding scale ...	195—205	...
590,407	,,	7	7	Do. 7 p.c. max. ...	158—163	...
493,960	,,	6	6	Do. 6 p.c. Pref. ...	134—139	...
50,000	June 20	3	3	Do. 3 p.c. Deb. ...	78—83	...
262,025	,,	4	4	Do. 4 p.c. Deb. ...	98—103	...
335,000	,,	5	5	Do. 5 p.c. Deb. ...	115—120	...
357,900	Aug. 8	7½	7½	Brighton, &c., 6 p.c. Con. ...	142—147*	...
649,955	,,	6½	6½	Do. 5 p.c. Con. ...	126—131*	...
205,500	,,	6	6	Do. 6 p.c. 'B' Pref.	125—130*	...
855,000	Mar. 7	7	8	British Ord.	138—143	...
100,000	June 3	7	7	Do. 7 p.c. Pref.	140—145	...
350,000	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	...
120,000	,,	4	4	Do. 4 p.c. Red. Deb. ...	94—99	...
450,000	,,	5	5	Do. 5 p.c. Red. Deb. ...	102—107	...
450,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	94—99	...
100,000	22 May '33	6	4	Cape Town, Ltd.	1—2	...
100,000	6 Nov. '33	4½	4½	Do. 4½ p.c. Pref. ...	1½—3½	...
150,000	June 20	4½	4½	Do. 4½ p.c. Deb. ...	60—70	...
626,860	July 18	6	6	Cardiff Con. Ord.	118—123	...
237,860	June 3	5	5	Do. 5 p.c. Red. Deb.	105—110	...
98,936	Mar. 21	2/-	2/-	Colombo Ord....	1⅝—1⅞	...
24,510	,,	1/4½	1/4½	Do. 7 p.c. Pref.... ...	23/—25/-	...
739,453	Mar. 21	–/11·48	–/11·48	Colonial Gas Assn. Ltd. Ord.	16/6—18/6	...
296,144	,,	1/3·30	1/3·30	Do. 8 p.c. Pref. ...	23/—25/-	...
1,775,005	Aug. 8	5	5	Commercial Ord.	79—84*	...
140,000	,,	—	13/4§	Do. 4 p.c. Red. Pref.	97—100*	...
620,000	June 3	3	3	Do. 3 p.c. Deb. ...	72—77	...
286,344	Feb. 7	5	5	Do. 5 p.c. Deb. ...	114—119	...
200,000	—	—	—	Do. 3½ p.c. Red. Deb.	99—102	...
807,560	Aug. 8	7	7	Croydon sliding scale ...	135—140*	...
644,590	,,	5	5	Do. max. div. ...	105—110*	...
620,385	June 20	5	5	Do. 5 p.c. Deb. ...	115—120	...
239,000	Aug. 8	5	5	East Hull Ord. 5 p.c.	94—99*	...
185,355	Aug. 8	6	6	East Surrey Ord. 5 p.c. ...	116—121*	...
176,211	June 3	5	5	Do. 5 p.c. Deb. ...	115—120	...
250,000	July 4	4	8	Gas Consolidation Ord. 'B'...	20/—21/-	...
250,000	May 9	4	4	Do. 4 p.c. Red. Cum. Pref.	17/6—19/6	...
19,223,324	Aug. 8	5⅜	5⅜	Gas Light & Coke Ord. ...	23/3—24/3*a	—/3
2,600,000	,,	3½	3½	Do. 3½ p.c. max. ...	79—82*	...
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref. ...	99—102*	...
2,993,000	July 4	—	3⅜	Do. 3⅜ p.c. Red. Pref. ...	100—103	...
8,602,497	May 23	3	3	Do. 3 p.c. Con. Deb. ...	82—84	...
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb. ...	111—114	...
3,500,000	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	109—112	...
700,000	Mar. 7	3½	3½	Do. 3½ p.c. Red. Deb. ...	97½—100½	...
270,466	Feb. 21	6	6	Harrogate New Cons. ...	118—123	...
157,500	Mar. 21	1/2⅜	1/–‡	Hong Kong and China Ord. ...	⅝—1	...
213,200	Aug. 8	6	5⅜	Hornsey Con. 3½ p.c. ...	98—108*	...
5,600,000	May 9	8	12	Imperial Continental Cap ...	118—123	—2
223,130	July 18	3½	3½	Do. 3½ p.c. Red. Deb. ...	87—92	...
285,242	Aug. 8	8½	8½	Lea Bridge 5 p.c. Ord. ...	164—169*	...
11,751	Feb. 21	8	10	Maidstone 5 p.c. Cap. ...	175—185	...
63,480	June 20	3	3	Do. 3 p.c. Deb.... ...	70—75	...
75,000	May 23	†10	†10	Malta & Mediterranean ... Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	137—142 99—102	... ...
392,000	Apl. 1	5½	5½			
231,977	Feb. 21	5	5	M.S. Utility 'C' Cons. ...	99—104	...
968,658	Feb. 21	4	4	Do. 4 p.c. Cons. Pref.	97—102	...
360,075	June 20	4	4	M.S. Utility 4 p.c. Deb. ...	97—102	...
148,955	,,	5	5	Do. 5 p.c. Deb. ...	113—118	...
675,000	May 9	†6	†6	Montevideo, Ltd.	73—78	...
250,000	Aug. 8	7½	7½	North Middlesex 6 p.c. Con.	142—147*	...
396,160	Aug. 8	5	5	Northampton 5 p.c. max. ...	105—110*	...
300,000	Apl. 25	†9	†7	Oriental, Ltd.	147—152	...
468,537	June 3	8	8	Plymouth & Stonehouse 5 p.c.	150—155	...
621,667	Aug. 8	8½	8½	Portsmouth & Gosport Cons.	157—162*	...
241,446	,,	5	5	Do. 5 p.c. max. ...	100—105*	...
73,350	,,	5	5	Do. 5 p.c. Pref. ...	107—112*	...
75,000	,,	4	4	Do. 4 p.c. Pref. ...	94—99*	...
114,000	Aug. 8	5	5	Preston 5 p.c. Pref.	104—109*	...
247,966	June 3	4	4	Primitiva 4 p.c. Cons. Deb. ...	98—103	...
625,959	July 18	4	4	Do. 4 p.c. Red. Deb. ...	94—99	...
15,000	Mar. 21	6	6	San Paulo 6 p.c. Cum. Pref. ...	8½—9½	...
441,275	Apl. 25	1/1½	1/1½	Severn Val. Gas Cor. Ld. Ord.	21/—22/-	...
460,810	Mar. 21	–/10⅝	–/10⅝	,, ,, 4½ p.c. Cum. Pref.	19/6—21/6	...
133,201	Feb. 7	8½	5	Shrewsbury 5 p.c. Ord. ...	128—133	...
9,000	June 3	4	‡4	South African Ord.	4½—5½	...
1,371,752	Apl. 25	1/2⅜	1/2⅜	South East'n Gas Cn. Ld. Ord.	22/—24/-	...
871,636	Mar. 7	–/10⅝	–/10⅝	Do. 4½ p.c. Red. Cum. Pref.	20/6—22/6	...
498,818	,,	4	4	Do. 4 p.c. Cum. Pref. ...	18/—20/-	...
450,000	,,	4	4	Do. 4 p.c. Deb.	99—102*	...
150,000	Aug. 8	3½	3½	Do. 3½ p.c. Red. Deb. ...	94—97*	...
6,709,895	,,	6	5	South Met. Ord.	105—108*	...
1,135,812	Aug. 8	6	6	Do. 6 p.c. Irred. Pref. ...	128—133*	...
850,000	,,	4	4	Do. 4 p.c. Irred. Pref. ...	96—99*	...
1,895,445	June 20	3	3	Do. 3 p.c. Deb.	77½—80½	...
1,000,000	July 4	5	5	Do. 5 p.c. Red. Deb. ...	109—112	...
600,000	,,	—	§31/–	Do. 3½ p.c. Red. Deb. ...	99—102	...
1,543,795	Aug. 8	6	6	South Suburban Ord. 5 p.c. ...	116—121*	...
512,825	,,	5	5	Do. 5 p.c. Pref.... ...	108—113*	...
500,000	,,	4	4	Do. 4 p.c. Pref.... ...	94—99*	...
250,000	,,	3½	3½	Do. 3½ p.c. Red. Pref. ...	97—100*	...
888,587	June 3	5	5	Do. 5 p.c. Deb.	115—120	...
250,000	,,	4	4	Do. 4 p.c. Deb.... ...	96—101	...
200,000	Aug. 8	3½	3½	Do. 3½ p.c. Red. Deb. ...	93—98*	...
427,859	Apl. 25	1/2⅜	9⅜	S. Western Gas & Water Ord.	16/—18/–	—/6
160,523	,,	–/10⅝	–/10⅝	Do. 4½ p.c. Red. Cum. Pf.	19/—21/-	...
110,000	June 3	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
750,541	Aug. 8	5½	5	Southampton Ord. 5 p.c. ...	106—111*	...
148,836	June 3	4	4	Do. 4 p.c. Deb.	95—100	...
350,000	Aug. 8	5½	5½	Swansea 5½ p.c. Red. Pref. ...	106—111*	...
94,000	June 3	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
1,076,490	Aug. 8	6½	6½	Tottenham and District Ord.	125—130*	...
409,835	,,	5½	5½	Do. 5½ p.c. Pref. ...	117—122*	...
62,235	,,	5	5	Do. 5 p.c. Pref. ...	110—115*	...
371,850	June 3	4	4	Do. 4 p.c. Deb. ...	96—101	...
85,701	Apl. 25	6	6	Tuscan 6 p.c. Red. Deb. ...	95—101	...
888,629	Apl. 4	4	6	U. Kingdom Gas Cor. Ord. ...	18/6—20/6	...
937,743	May 9	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	19/6—21/6	...
500,000	,,	–/1·15	4	Do. 4 p.c. 1st Red. Cum. Pf.	19/—21/-	...
745,263	June 3	4½	4½	Do. 4½ p.c. 2nd Non-Cum.Pf.	16/—18/-	...
1,000,000	Mar. 7	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—99	...
373,939	Aug. 8	7	7	Uxbridge, &c., 5 p.c.	132—137*	...
133,010	,,	5	5	Do. 5 p.c. Pref. ...	108—113*	...
1,371,138	Aug. 8	7	7	Wandsworth Consolidated ...	135—140*	...
2,525,768	,,	4	4	Do. 4 p.c. Pref. ...	96—100*	...
1,343,964	June 3	5	5	Do. 5 p.c. Deb. ...	115—120	...
383,745	,,	4	4	Do. 4 p.c. Deb. ...	97—102	...
400,000	,,	—	§25/–	Do. 3½ p.c. Red Deb.	97—102	...
558,342	Aug. 8	7	6⅞	Watford and St. Albans Ord.	133—138*	...
200,000	,,	5	5	Do. 5 p.c. Pref. ...	108—113*	...
200,000	,,	5½	5½	Do. 5½ p.c. Pref. ...	118—123*	...
200,000	June 3	4	4	Do. 4 p.c. Red. Deb.	96—101	...
100,000	,,	3½	3½	Do. 3½ p.c. Red. Deb.	94—99	...

a.—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax. ‡ For year. § Actual.

Supplementary List and Provincial Exchanges overleaf.

STOCK AND SHARE LIST—Cont.

Supplementary List, not Officially Quoted, London

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Nominal Quotations Aug. 19.	Rise or Fall on Week.
202,152	Mar. 21	5	5	Ascot Ord.	103—108	...
128,182	July 18	5	5	Do. 5 p.c. Pref.	108—113	...
31,035	Mar. 21	...	–/4½	Associated Utilities 4 p.c. Pref.	16/—18/–	...
100,000	Dec. 13	...	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
17,000	Feb. 21	8	8	Bognor Orig. Ord. 'A' ...	155—165	...
62,210	,,	8	8	Do. New Addl. 'A' ...	155—165	...
87,160	,,	7	7	Do. New 7 p.c. max. ...	150—160	...
37,440	Aug. 8	10	10	Cam. Univ. & Town 10 p.c. max.	188—198*	...
125,970	,,	7	7	Do. 7 p.c. max.	133—138*	...
39,025	,,	5	5	Do. 5 p.c. max.	97—102*	...
96,410	July 18	4½	4½	Cardiff 4½ p.c. Pref.	95—100	...
150,000	Aug. 8	4	4	Croydon 4 p.c. Pref.	97—100*	...
130,000	June 20	4	4	Do. 4 p.c. Deb.	97—102	...
65,000	Aug. 8	8½	7½	Eastbourne 'A' 5 p.c. ...	138—148*	...
198,000	,,	7	6	Do. 'B' 3½ p.c.	115—125*	...
112,312	,,	5	5	Do. 5 p.c. Pref.	107—112*	...
130,000	June 20	5	5	Do. 5 p.c. Deb.	112—117	...
24,000	Aug. 8	8½	8½	Great Yarmouth 8½ p.c. max.	43—48*	...
59,400	,,	7½	7½	Do. 7½ p.c. max.	33—38*	...
51,160	June 3	5½	5½	Do. 5½ p.c. Deb.	121—126	...
152,600	Feb. 21	8	9	Guildford Cons.	167—172	...
54,055	,,	5	5	Do. 5 p.c. Pref.	108—113	...
68,250	June 20	5	5	Do. 5 p.c. Deb.	107—112	...
156,600	Feb. 21	7½	7½	Hampton Court Cons. ...	138—143	...
80,000	Aug. 8	4	4	Lea Bridge 4 p.c. Pref. ...	94—99*	...
60,000	,,	6	6	Do. 6 p.c. Pref.	121—126*	...
94,876	June 3	4	4	Do. 4 p.c. Deb.	95—100	...
73,620	Mar. 7	8½	8½	Luton Cons. 'A'	155—165	...
107,960	Mar. 21	4	5½	Mid Kent Ord.	8¾—9¾	...
230,940	Aug. 8	10	10	Oxford & District Ord. ...	195—200*	...
47,112	,,	5	5	Do. 5 p.c. Pref.	106—111*	...
50,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	107—112*	...
126,193	May 9	7½	7½	Peterborough Ord.	135—145	...
64,990	Mar. 7	6½	7½	Redditch Ord....	120—130	...
166,850	Aug. 8	8	8	Romford Ord....	142—147*	...
60,000	,,	4	4	Do. 4 p.c. Pref.	97—100*	...
44,000	Mar. 21	5	5	Do. 5 p.c. Deb.	111—116	...
25,570	Aug. 8	5½	5½	Rugby 5½ p.c. Pref.	120—125*	...
25,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	104—109*	...
42,750	June 3	5½	5½	Do. 5½ p.c. Deb.	118—123	...
110,950	Feb. 21	8	8	Ryde Ord.	140—150	...
270,086	Mar. 21	7	7	Slough Ord.	128—133	...
21,000	June 20	5	5	Do. 5 p.c. Deb.	110—115	...
28,872	May 9	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	19/—21/–	...
28,866	Mar. 7	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6	...
117,228	Aug. 8	7	5	Swindon Cons.	102—107*	...
60,425	June 3	5	5	Do. 5 p.c. Deb.	112—117	...
64,380	June 3	5	5	Torquay & Paignton 5 p.c. Pref.	107—112	...
130,000	Aug. 8	8	5	Wakefield Ord.	116—121*	...
81,650	,,	5	5	Do. 5 p.c. max.	100—105*	...
82,000	Aug. 8	6	6	Weymouth Ord.	103—108*	...
98,384	Feb. 7	6	6	Wolverhampton 6 p.c. Pref.	118—123	...
160,000	June 20	5½	5½	Do. 5½ p.c. Rd. Db.	105—110	...
90,000	June 20	5	5	York 5 p.c. Red. Deb. ...	104—109	...
133,640	July 18	6½	6½	Yorktown (Cam.) 5 p.c. Cons.	118—123	...
120,000	,,	5	5	Do. 5 p.c. Pref.	105—110	...
35,000	June 3	5½	5½	Do. 5½ p.c. Deb.	120—125	...

BRISTOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Aug 19.	Rise or Fall on Week.
347,756	July 18	6	5	Bath Cons.	118—120	...
1,667,250	July 18	5	5	Bristol, 5 p.c. max.	111—113	...
120,420	June 3	4	4	Do. 1st 4 p.c. Deb. ...	101—103	...
217,870	,,	4	4	Do. 2nd 4 p.c. Deb. ...	101—103	...
328,790	,,	5	5	Do. 5 p.c. Deb.	119—122	...
274,000	Aug. 8	5	5	Newport (Mon). 5 p.c. max....	97—99*	...
13,200	Mar. 21	7	8⅔	Pontyp'l Gas & W. 10 p.c. 'A'	13—14	...
13,600	,,	5	6	Do. 7 p.c. 'B'	12—12½	...
40,000	,,	5	6	Do. 7 p.c. 'C'	12—12½	...
140,778	Aug. 8	5	5	Weston-super-Mare Cons. ...	108—110*	...
64,338	June 20	4	4	Do. 4 p.c. Deb.	99—101	+2½
33,340	,,	7⅛	7⅛	Do. 7⅛ p.c. Deb.	151—154	...

LIVERPOOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Aug 19.	Rise or Fall on Week.
157,150	Aug. 8	6½	5	Chester 5 p.c. Ord.	107—110*	...
92,500	June 20	4	4	Do. 4 p.c. Pref.	95—99	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	87—90	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	97—101	...
2,167,410	Feb. 21	6	6	Liverpool 5 p.c. Ord.... ...	124½—125½	...
245,500	June 20	5	5	Do. 5 p.c. Red. Pref. ...	97—102	...
306,083	July 18	4	4	Do. 4 p.c. Deb.... ...	100—102	...
106,280	Aug. 8	10	10	Preston 'A' 10 p.c.	198—208*	...
188,219	,,	7	7	Do. 'B' 7 p.c.	131—141*	...

NEWCASTLE EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Aug 19.	Rise or Fall on Week.
122,577	Aug. 8	8	8	Blyth 5 p.c. Ord.	161—162*	...
732,000	Feb. 21	5	5	Hartlepool G. & W. Cn. & New	110—112	...
2,061,315	Feb. 7	5⅔	5	Newcastle & Gateshead Con.	23/3–24/–*σ	+–/1½
682,856	,,	4	4	Do. 4 p.c. Pref. ...	99—100*	...
776,706	June 20	3½	3½	Do. 3½ p.c. Deb. ...	88½—89½	...
277,285	May 9	5	5	Do. 5 p.c. Deb. '43 ...	104—106	...
332,351	Feb. 7	6	6	Sunderland 6 p.c. max. ...	137—139	...

NOTTINGHAM EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Aug 19.	Rise or Fall on Week.
542,270	Aug. 8	9	6	Derby Con.	133—143*	...
55,000	June 3	4	4	Do. 4 p.c. Deb.	100—105	...
20,000	June 20	5	5	Long Eaton 5 p.c. Pref. ...	10—12	...
80,000	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...

SHEFFIELD EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Aug 19.	Rise or Fall on Week.
10,000	Aug. 8	10	10	Great Grimsby 'A' Ord. ...	205—215*	...
6,500	,,	10	10	Do. 'B' Ord. ...	205—215*	...
79,000	,,	10	10	Do. 'C' Ord. ...	195—205*	...
1,806,339	Feb. 21	6⅓	6⅓	Sheffield Cons.	£140—143	...
95,000	July 4	4	4	Do. 4 p.c. Deb.	101—103	...

σ The quotation is per £1 of Stock. * Ex div.

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